ARCHIVES OF OTOLOGY.

REPORT OF A FATAL CASE OF BRAIN ABSCESS OF OTITIC ORIGIN.[1]

By GORHAM BACON, M.D.

(*With two photographs on Text-plate VI.*)

The patient, Max S., aged forty-four, single, Russian, was admitted Jan. 21, 1904, and came under my care at the infirmary. He has been a healthy man and denies having had syphilis. He has had two operations on his ear, the first time in September, 1902, when he suffered from acute purulent otitis media. At that date the mastoid cells were opened, and apparently he was cured in several weeks' time.

In the latter part of September, 1903, after blowing his nose quite violently, he felt a sudden fulness in the same ear, followed by pain. An abscess developed behind the ear, which broke, leaving a sinus opening into the mastoid cells. There was also a purulent discharge from the canal.

A radical operation (Schwartze-Stacke) was performed October 3, 1903. The dura above was exposed, owing to a necrotic condition of the bone. A probe entered an opening in the dura leading to the temporo-sphenoidal lobe, but no pus was found at that time. The canal was packed, and the wound, posteriorly, was partially closed, and by October 15, 1903, had entirely healed. During this time his pulse varied from 68 to 100, and his temperature never rose higher than 100° F.

The present trouble has lasted since the second operation. The discharge from the canal has persisted with more or less headache, which patient says is continuous and very severe at times and is confined to the right side of the head, the orbital and parietal regions being especially affected.

[1] Read at the May meeting, 1904, of the Section of Otology in the N. Y. Academy of Medicine.

Examination.—The right mastoid shows the remains of an old depressed cicatrix. There is no tenderness on pressure. At the bottom of the canal can be seen a false membrane with a perforation, and there is some purulent secretion. The patient is fairly well nourished. Tongue coated. Heart and lungs normal.

An ophthalmoscopic examination showed double optic neuritis with hemorrhages.

On January 22d, the day following admission, he complained of a great deal of pain on the right side of the head. He gives no history of dizziness, or vomiting, or seizures of any kind, nor are there any evidences of paralysis. He seems stupid in answering questions. He dozes a great part of the time, frequently moaning and crying out. Temperature at noon to-day was 102.5° F., pulse 80, respiration 20. A diagnosis of abscess in the right temporo-sphenoidal lobe was made.

Jan. 23d.—Operation.

An incision was made from the lowest point of the mastoid and carried close to the auricle upwards and curved around the latter towards the orbit and well into the temporal region. By carrying an incision upward, good exposure was obtained of the mastoid process and the bone covering the temporo-sphenoidal lobe. A large area of bone was cut away from the region of the antrum in a direction upwards so as to uncover a considerable portion of the dura. The dura behind and just above the antrum was found covered with granulations. The middle ear was cleared of all granulations, necrosed bone was removed, and the sinus was exposed and found healthy. The dura over the temporo-sphenoidal lobe was found tense, and a probe was passed through an opening in the dura, in the region of the antrum. A scalpel was introduced in the most dependent portion, and passed upwards and forwards, when from two to three ounces of thick yellowish-green pus were evacuated. There was very little odor to the pus, and the abscess cavity was found lined with a smooth and firm wall. The little finger was introduced to a depth of two inches, and the cavity was gently irrigated with sterile water through a double tube, and sterile gauze was inserted for drainage.

Jan. 24th.—The patient was restless during the night and complained of considerable pain, but feels much better this morning. Temperature, 99.4° F. Mental condition improved.

Feb. 5th.—For the past two weeks the patient has been making

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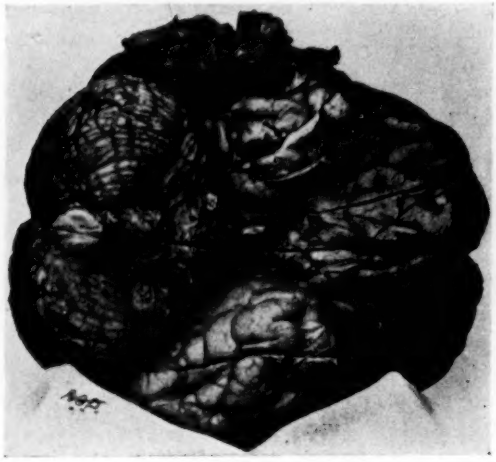

Photograph of brain showing hernia cerebri.

Photograph of brain showing abscess cavity in temporo-sphenoidal lobe, and a portion of the hernia cerebri.

steady progress and has been free from pain. For a few days after the operation the temperature ranged from 99° to 100°, and gradually became normal, although at times it would rise to 99° or 99½°. During this time the pulse varied from 72 to 96. His mental condition has been good. To-day he complains of the same pain again in the right side of the head.

March 3d.—Since February 5th the wound has been frequently dressed and there appeared to be good drainage. The symptoms, however, have been steadily growing worse. In addition to the pain in the head, he has been restless, constantly moaning and crying out. He refuses nourishment, is drowsy a great portion of the time, and is mentally much depressed. Tongue thickly coated and breath foul. Under chloroform anæsthesia I made a thorough examination of the abscess cavity, but could not find anything there to account for the symptoms. The drainage from the abscess cavity was excellent.

March 8th.—As the patient was steadily growing worse I called in Dr. Frank Murray, and finding that there was some tension of the dura anterior to the previous opening, a scalpel was introduced at this point and some pus evacuated. These two openings in the dura were found to communicate with the same abscess cavity in the brain. Drains of rubber tissue and gauze were introduced, and a moist carbolic-acid dressing was applied.

March 14th.—Patient noisy and excited; he tore off the bandage.

March 16th.—Delirious at times, and he requires morphine. Temperature has not been above 100°.

March 17th.—Has been in deep stupor most of the day and he passes his stools and urine involuntarily.

March 19th.—He was again given chloroform, and the two openings in the brain were made into one, and on investigation more pus was found farther forward in the temporo-sphenoidal lobe and in the original abscess cavity.

March 20th.—Temperature rose to 104° after the operation; pulse 96. Involuntary urination and stools continue. He has taken his nourishment somewhat better.

March 21st.—In deep stupor most of the time. The temperature remains high. He has great pain in his head. The pulse is becoming rapid and weaker.

March 22d.—Since the last note, the patient has gradually

become weaker. The temperature rose to 107° at 9 P.M., and he died at 11.30 P.M.

Autopsy.—A large operative wound behind right ear, with hernia cerebri protruding.

Brain.—Vertex showed considerable venous congestion, and a slightly cloudy serous exudate in the sulci. The pons, medulla, and postero-inferior portion of the cerebellum were covered with a plastic exudate. The vertebral canal contained a considerable quantity of sero-purulent fluid. The greater portion of the right temporo-sphenoidal lobe was excavated, and the abscess cavity (which had recently broken into the right lateral ventricle) was filled with a mass of granulating brain tissue.

The left side of the brain, including the ventricles, was normal, except as above.

Smears or cover-glass preparations from the abscess cavity showed mixed infection—streptococcus, staphylococcus, a diplococcus (possibly streptococcus), and a short thick bacillus.

Remarks.—The remarkable points in this case seemed to me to be the absence of the usual symptoms found in such cases. There was no history of a chill, nausea, vomiting, or vertigo. The pulse was not slow at any time, nor was the temperature below normal. In fact, the more common symptoms were absent. The diagnosis pointed to an abscess in the temporo-sphenoidal lobe, from the fact that the patient gave a history of two operations on the mastoid having been performed previously, while for the preceding two months or so he suffered from severe and persistent headache on the same side, and an ophthalmoscopic examination showed choked disc with hemorrhages in each eye.

There was considerable difficulty in draining the abscess cavity. The external opening was large, but there was always a tendency for the pus to burrow, and finally it burst into the lateral ventricle. The post-mortem examination showed that there was no retention of pus in the abscess cavities.

REPORT OF A FATAL CASE OF LATENT TEMPORO-SPHENOIDAL ABSCESS OF OTITIC ORIGIN, FOLLOWED BY MULTIPLE SECONDARY CEREBRAL ABSCESSES.[1]

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(*With four figures on Text-plates VII. and VIII.*)

WHILE the report of every successful operation for otitic brain abscess is a valuable contribution to the literature of otological surgery and a distinct triumph for the surgeon, it is nevertheless a duty to report in detail those fatal cases which are unusual in their course, with the hope that some point may be brought out which will assist in the diagnosis and successful treatment of subsequent obscure cases.

Lillie K., eleven years of age, of German parentage, was brought to the New York Infirmary for Women and Children on April 22, 1903, suffering from mastoiditis following chronic suppuration of the left ear.

Heredity.—The family history was unimportant.

Previous Illness.—The child had measles at two years of age, diphtheria at four years, and typhoid fever at five years. Since the last illness she has occasionally had a slight purulent discharge from the *left* ear.

[1] Read at the Twenty-ninth Annual Meeting of the Alumnæ Association of the Woman's Medical College of Pennsylvania, held in Philadelphia, May 19 and 20, 1904.

The mother states that about a year before the present illness the girl began to have attacks of headache, dizziness, nausea, vomiting, and constipation, and gradually lost flesh and strength. She was sent to the country for a few weeks in the summer, but did not regain her health. During the following winter she attended school, but continued to have occasional attacks of dizziness, nausea, and vomiting, and persistently complained of headache. The mother considered these only "bilious attacks," since, with the exception of the first, they were not severe enough to necessitate keeping the child from school or calling a physician to see her.

In the last week of March, 1903, the girl became *much overheated while jumping rope at school, and within a few hours was seized with dizziness and vomiting.* The following day she had severe headache, chills and fever, restlessness, and a slight cough.

On March 27th, Dr. Annie S. Daniel, who has charge of the out-practice of the Infirmary, was called to see the patient, and to her I am indebted for the history of the girl's illness during the four weeks preceding her admission to the Infirmary for mastoid operation.

Present Illness.—From March 27th to April 13th, the patient had right lobar pneumonia. The course of the disease was irregular. From April 4th to the 11th, a chill followed by a rise of temperature occurred daily. The chills varied in intensity from a sensation of cold to prolonged rigor lasting half an hour. Temperature ranged from 100 to 105 degrees. It is to be noted that *severe frontal headache* was a *persistent symptom* throughout this period, and there were exacerbations of pain in the head which caused the child to scream out.

On April 13th, the seventeenth day of her illness, the child said there was a sound in her head as though something had broken, and it was noticed that a *profuse purulent discharge* was coming from her *left ear.* From April 11th to 17th, the chills subsided and the temperature varied from 99 to 103 degrees. The pulse ranged from 80 to 92 and was of good quality. The pneumonia resolved entirely, and the respirations were from 26 to 40 per minute, full and regular.

The discharge from the ear continued free for three days, when it ceased. No special pain or tenderness was referred to the mastoid region, but the child complained persistently

ILLUSTRATING DR. A. E. WAKEFIELD'S PAPER.

Fig. 1.—Showing latent and secondary abscess cavities in left temporal lobe with a portion of the wall separating them.

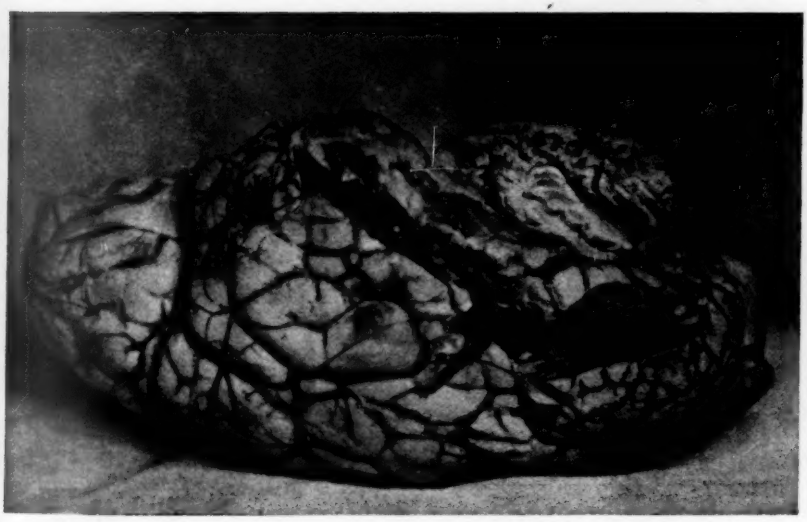

Fig. 2.—Showing abscess cavity in right temporal lobe.

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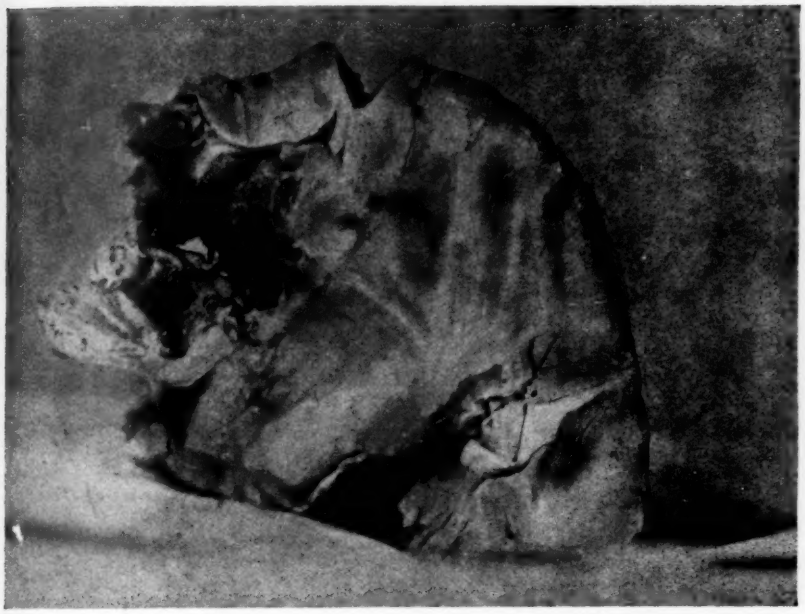

Fig. 3.—Cross-section showing patches of necrotic brain tissue lining the wall of the original abscess in left temporal lobe.

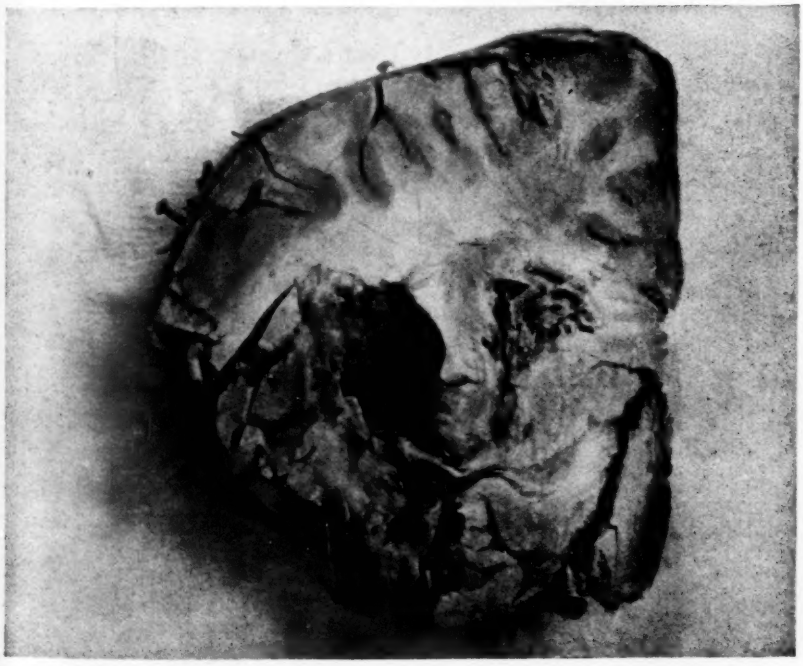

Fig. 4.—Cross-section through secondary abscess cavity in left temporal lobe, also showing left lateral ventricle containing pyogenic membrane.

of violent frontal headache. She became thinner, paler, and more restless. Her sleep was troubled. She appeared somewhat dull, but, when aroused, answered all questions intelligently, and took food when it was offered her, but she did not call for it.

On April 19th, the child became cyanosed and had a violent chill, which the mother thought was a convulsion, which lasted half an hour; temperature, 105°; respiration, 26; pulse, 96. The child was conscious and complained of loud noises in her head.

On April 22d, the patient was restless and *delirious;* passed urine involuntarily, and had a prolonged chill followed by temperature 106.4°, pulse 122, respiration 22. The discharge from the left ear reappeared; there was some tenderness over the mastoid; and the patient was removed to the hospital for operation.

Condition on Admission to the Hospital.—The patient was extremely thin and her expression was one of profound exhaustion. The skin was dry and of a yellowish hue; the lips were dry and brown, and the teeth covered with sordes. Her mind was clear, and she answered all questions readily and intelligently. There were no paralyses.

Eyes.—Vision was unaffected. The pupils were of medium size and equal, and their reaction to light and accommodation was normal.

Ears.—The right ear was normal. The left ear-canal was narrowed and contained thick green pus. The drum membrane was bulging at its junction with the upper canal wall. The soft tissues over the mastoid were reddened and œdematous. Deep pressure over the antrum gave the child considerable pain.

Operation.—The patient was immediately prepared for operation, and under ether anæsthesia a free incision was made through the upper and back part of the drum membrane and the sagging canal wall. The mastoid region was then exposed by the usual incisions. When the periosteum was raised, a small adherent granulation was found over the centre of the antrum pit. Upon its removal pus welled up. While the entire mastoid cortex was being chiselled away, the discharge of pus from the antrum was marked by pulsations which were synchronous with the heart-beats and were increased by coughing. This seemed to indicate that the inner table of the mastoid had been destroyed; and upon careful removal of the necrosed tissue with a dull curette the vertical arm of the sigmoid sinus was exposed.

The upper part of the antrum and the aditus were then cleansed of granulations and a probe was passed into the tympanum, the walls of which were found roughened. No perforations into the cranial cavity could be detected, and a dressing of iodoform gauze was introduced into the aditus and upper part of the antrum, to shut off this space from that around the exposed lateral sinus. Further examination of the exposed sinus showed that the dura was thickened, discolored, and covered with grayish granulations. No pulsations were visible; the sinus wall was partially collapsed, and thrombosis was suspected.

An incision about 4*mm* in length through the wall of the sinus brought a free flow of blood. The hemorrhage was immediately controlled by pressure and the usual mastoid dressings were applied.

Course after Operation.—For the twenty-four hours following the operation, the temperature did not rise above 102° F.; pulse, 104; respiration, 22. The patient slept continuously for four hours; no vomiting; took nourishment well; was sensitive to noise.

April 23d.—The patient had a comfortable day and slept well the following night.

April 24th.—At 9 A.M. she had a chill lasting fifteen minutes; temperature, 105.6°; pulse, 116; respiration, 32, irregular in depth and frequency. The dressings were changed, and the incision which was made in the sigmoid sinus two days previously was reopened with a probe. The sinus was found free and the dressings were reapplied.

April 25th.—The child slept only two hours during the night, was restless and irritable, and did not want to be touched; urinated involuntarily. At 1 P.M. had a slight chill; temperature, 104°; pulse, 136; respiration, 28, irregular in depth and frequency.

April 26th.—At 6.30 A.M. the patient had another chill; temperature, 104°; pulse, 136; respiration, 36, regular but shallow. She had periods of extreme restlessness alternating with drowsiness. When aroused, she answered all questions intelligently. There was no aphasia and no paralysis. Examination of the lungs and heart gave no signs that these organs were affected.

Examination of the Eyes.—No paralysis of ocular muscles; pupils about one-third dilated, equal; reaction to light sluggish. The retinal veins of the left eye were engorged and tortuous.

The color of the disc was grayish and its outline hazy. There were no hemorrhages. The retinal veins of the right eye were somewhat injected; otherwise the interior was normal.

The recurring chills followed by high temperature, the violent and persistent headache, the increasing drowsiness, the appearance of the eye-grounds, with beginning dilatation of the pupils, the occasional extreme restlessness, the irregular and shallow respiration, and the rapid pulse indicated, in the absence of sinus thrombosis, other intracranial suppuration. Since there were no localizing symptoms, it was decided to explore the left temporo-sphenoidal lobe as being the most probable site of suppuration.

Second Operation (*April 26th*).—The patient was prepared for operation, and the original mastoid incision was extended upward and forward along the root of the zygoma for a distance of about 3*cm*. With a rongeur forceps the opening in the mastoid was enlarged upward and forward until an area of dura measuring 2½ by 1½*cm* was exposed. The opening thus made in the bone gave ready access to that part of the temporo-sphenoidal lobe which directly overlies the tympanum. The dura, which was uncovered, was normal in appearance; there was no bulging and no visible pulsation. The finger was then introduced under the temporo-sphenoidal lobe along the floor of the middle cranial fossa, and firm adhesions were found between the dura and the roof of the tympanum. These adhesions were not broken.

A curved incision about 3*cm* in length, with its convexity directed backward, was then made in the lower and back part of the exposed dura. The surface of the brain tissue was somewhat congested; it protruded slightly through the dural opening, and pulsations could be distinctly felt. A grooved director was passed into the temporo-sphenoidal lobe forward and inward for a distance of 4*cm*, when a thin, turbid, grayish fluid appeared along the groove of the director. A small pair of artery forceps was then passed along the director, which was held in position until the blades of the forceps were separated, to enlarge the opening. About two drachms of thin fluid, containing finely granular particles and shreds of degenerated brain substance escaped. The little finger was then introduced into this cavity, the walls of which were felt to be roughened but firm and resistant. A few shreds of degenerated brain tissue were removed when the finger was withdrawn. The cavity was lightly packed

with a narrow strip of iodoform gauze and the outer dressings were applied. A specimen of the fluid and shreds of tissue taken from the cavity were sent to the pathologist for examination.

April 26th and 27th.—For two days following the opening of the cerebral abscess, the patient's condition improved. She appeared much brighter, and the pain in her head subsided. She enjoyed her food and conversed quite naturally. She was interested in other patients in the ward and asked to see the pictures in a magazine. There were no chills. The temperature ranged from 98.4° to 103°; pulse 100 to 116, regular and of good quality; respiration 28 to 32, regular. The child was more quiet during sleep. The dressings were changed daily. The mastoid wound discharged little pus. The drainage gauze from the abscess cavity was moist but showed no pus.

April 29th.—On the third day following the first operation, the patient was much worse. She had a chill lasting fifteen minutes; temperature, 104.2°; pulse, 118; respiration, 32, irregular; perspired profusely; had attacks of screaming and was at times delirious. The left eye began to turn inward; the left pupil was greatly dilated and did not react to light. The patient refused food and medicine.

While changing the dressings, the drainage gauze was carried into the abscess cavity with dressing forceps. The slight pressure which was made to reach the highest point of the cavity broke down the wall between this and a *second abscess* situated above and behind the first, and one and one-half ounces of offensive, thin, green pus poured out of the dural opening. A finger was then introduced into the second cavity, and the opening between the two was enlarged sufficiently to insure proper drainage. The outer dressings were then applied.

April 30th.—The patient was more quiet during the following night. She had no chill; temperature ranged from 98½° to 101°; pulse, 110; respiration, 28; vomited food and medicine. During the night, the nurse noticed that the child did not move her right arm or leg. She lay in stupor much of the time, but, when aroused, recognized her mother and spoke to her.

May 1st.—There was left internal strabismus, left facial paralysis, and right hemiplegia. The head was retracted, and there was difficulty in swallowing.

May 2d.—The patient sank into coma, *and died* on the morning of the tenth day after her admission to the hospital.

Post-Mortem. — The body was extremely emaciated. There were no skin lesions. The lungs showed slight congestion and œdema of lower lobes. The bronchial glands were not enlarged. The heart was normal. The abdominal organs were practically normal. The mesenteries were not enlarged.

The Brain.—The dura was congested, thickened, and firmly adherent along either margin of the median fissure. On its removal, a thin strip of cerebral cortex, *7mm* in width and *4cm* in length, was torn off. No pus was visible over the cerebral surface above. Careful examination of the sinuses of the dura revealed no thrombi. The left lateral and sigmoid sinuses were thoroughly explored, even down beyond the jugular bulb, and were found entirely free. The dura mater at the base was normal excepting that portion which covers the surface of the left petrous bone corresponding to the roof of the tympanum. Here its outer surface was covered with dense connective tissue which was closely adherent to the bone underneath for an area measuring 7 by *12mm*. The adhesions were firm and appeared to have been of long standing. There was no evidence of extension of the inflammatory process on the inner surface of the dura at this point nor in the brain cortex overlying it.

The portion of bone forming the roof of the tympanum was roughened by adhesion to the dura and showed a dark bluish-gray discoloration. There was no erosion of the bony surface, and no perforation from the tympanic cavity could be made out.

Hemispheres.—The cerebral veins over the **left** hemisphere were engorged and the convolutions markedly flattened. The left temporal lobe presented near the centre of the second convolution an opening which was made at the time of the operation It measured *2cm* vertically and 1½*cm* horizontally.

About the margin of the opening, the dura and the pia were intimately adherent for a distance of *1cm*. This opening led into an abscess cavity in the anterior part of the temporo-sphenoidal lobe, the diameter of which from before backward was *4cm* and from below upward *2cm* at the deepest part. The anterior limit of the abscess cavity reached to within 1½*cm* of the anterior limit of the temporo-sphenoidal lobe. The thickness of the outer wall, measured along the opening into the abscess cavity, was a little more than *1cm*.

The inner wall of the abscess cavity showed several large dark bluish patches, the surface of which was roughened and

presented shreds and tags of disintegrated brain substance (Fig. 3). Between these plaques of necrotic tissue were smooth, white, firm areas representing the general abscess wall.

At the upper and back part of the cavity was a ridge *6mm* in thickness of apparently normal brain tissue which represented a portion of the *wall between the original latent abscess and the secondary abscess* (Fig. 1). The opening between these cavities admitted the tip of the index finger and looked upward and backward into the second cavity, which measured *4.5cm* in its antero-posterior diameter and *3cm* vertically. The deepest portion lay near the posterior extremity of the temporo-sphenoidal lobe, but did not encroach upon either the parietal or the occipital lobe. The abscess cavity did not approach the outer surface of the cerebral cortex nearer than *2cm* at any point (Fig. 4). The walls of the secondary abscess were smooth and white and showed no areas of necrosis. There was no obvious communication between this abscess cavity and that of the left lateral ventricle (Fig. 4).

The surface of the **right** hemisphere presented venous engorgement and compression of the convolutions equal in degree to that seen on the left. The surface of the temporo-sphenoidal lobe was partially collapsed, and on making an incision along its outer border (Fig. 2) about four ounces of thin green pus escaped. The abscess cavity measured *6cm* horizontally and *2cm* vertically, and communicated directly with the right ventricle by way of its middle horn. A *thin, white, homogeneous membrane lined the abscess cavity like a sac.* It was not adherent to the walls and collapsed when the abscess was incised. A prolongation of this "pyogenic"[1] membrane extended along the middle horn of the lateral ventricle upward into the body of the ventricle. The lateral ventricles were only slightly dilated, the right more than the left. Both were lined with pyogenic membranes (Fig. 4). No point of suppuration was found in the frontal, parietal, or occipital lobes of either hemisphere.

Cerebellum.—The under surface of the cerebellum presented a sharply limited, subpial accumulation of pus which covered nearly two-thirds of the under surface of the right hemisphere and, extending across the medulla, included one-half of the under surface of the left hemisphere. Over this area, the pia was

[1] Report of Dr. Louise Cordes, Pathologist, New York Infirmary for Women and Children.

opaque, thickened, and separated from the general cerebellar surface, and was raised from the depth of the sulci by the accumulation of purulent exudate. The interior of the cerebellum was apparently normal.

Bacteriological Findings.—Cultures on glycerine agar from the latent and secondary abscesses of the left temporal lobe, from the abscess in the right temporal lobe, from the subpial abscess on the under surface of the cerebellum, also from the blood taken from the vessels of the lungs and the cavity of the heart, —all showed an almost pure growth of the bacillus pyocyaneus.

Microscopic examination was made of the following areas of the brain:

(1) The floor of the old abscess cavity.

(2) The wall between the secondary abscess and the left lateral ventricle.

(3) The floor of the fourth ventricle.

(4) The central portion of the inferior surface of the pons.

(5) The wall of the abscess cavity in the right temporo-sphenoidal lobe.

Sections of the floor of the old abscess cavity show extensive degeneration and breaking down of the cerebral substance, which is infiltrated with pus cells. A large amount of exudate surrounds the blood-vessels, many of which contain thrombi. There are numerous hemorrhagic areas which contain free brown pigment. In some of these areas the red blood cells are well preserved. The brain tissue external to the degenerated areas is markedly œdematous and is infiltrated with fibrin and small round cells.

The wall between the secondary abscess and the left lateral ventricle has undergone degeneration and is everywhere infiltrated with small round cells. Perivascular exudate is marked, and the blood-vessels contain thrombi.

The remaining regions above enumerated show the following lesions in varying degrees of intensity: perivascular exudate and thrombosis; œdema of the brain substance, and infiltration of same with small round cells. A layer of fibrin and pus lines all the ventricles, and there are swelling and degeneration of the epithelium covering the ependyma. The pia mater covering the right lobe of the cerebellum is very markedly thickened. The membrane is infiltrated with fibrin and pus and the blood-vessels are much congested. The cerebellum is free from purulent infiltration.

CONCLUSIONS.

I. The history of this case emphasizes the fact that cerebral abscess may develop insidiously and remain quiescent, manifesting no characteristic symptoms for an indefinite period, until some acute illness or violent physical exertion renders the latent process manifest.

II. Uncomplicated acute cerebral abscess may be accompanied throughout its course by repeated chills, high temperature, and rapid pulse and respiration.

III. Localizing symptoms may be absent, unless the abscess itself or the surrounding encephalitis encroaches upon cortical areas whose functions are definitely known.

IV. Chronic suppurative otitis media attended with persistent localized headache and occasional attacks of dizziness, nausea, and vomiting, and with progressive loss of flesh and strength, should, in the absence of tuberculosis or other malignant disease, suggest the possibility of latent cerebral abscess.

V. The importance of post-mortem examination in obscure cases cannot be too strongly emphasized.

REMARKS ON A DOUBLE CEREBELLAR ABSCESS, OPERATIONS, AND RECOVERY, REPORTED BEFORE THE NEW YORK ACADEMY OF MEDICINE, ON JANUARY 8, 1903.[1]

By WELLS P. EAGLETON, Newark, N. J.

THIS paper has not been heretofore published, as Röpke has called attention to the fact that many successfully reported cases have, subsequently, terminated fatally. The case herein reported was operated on July 2, 1902. The patient has continued in perfect health, and remains so up to the present time, April, 1904.

Symptoms.—Severe pain in the head, rapid loss of flesh, vomiting, slow pulse, optic neuritis, and gradually deepening coma.

Diagnosis: Brain abscess. But was the suppuration located in the cerebrum or cerebellum? The *slight* lateral deviation of the eyes to the opposite side, frequent yawning, absence of the patellar reflexes, and indefinite history of total blindness of the previous day, pointed towards the cerebellum. Against this—twitchings of the opposite side, and inequality of the pupils.

It should be noted, that all the symptoms present before the first operation were either the general symptoms of increased intracranial pressure, or of irritation, there being no paralysis whatever. Later, however, during the development of the second abscess, a distinct paralysis of the hand and arm of the same side appeared. The

[1] See Archives of Otology for April, 1903, pp. 152–158, vol. xxxii., No. 2.

explanation probably lies in the difference in the position of the two abscesses.

Acland and Ballance say: "Clinical evidence seems to favor the view that the nucleus dentatus, or the bundle of fibres passing from it upwards, must be involved by the abscess when the type paralysis is present." [1]

At the time of the first operation, the abscess was small, and situated so externally in the lateral lobe of the cerebellum that the dentate nucleus was not affected, but when the second abscess developed, which extended well inwards, towards the median line, and, doubtless, involved the nucleus, paralysis of the upper extremity of the same side appeared.

Cause.—Was the abscess due to the otitis media, or to the blow on the head? The rapid development of the suppuration (19 days) from the beginning of the otitis tends towards the blow, as it is very rare to have an otitic brain abscess develop so rapidly. On the other hand, the absence of all signs of trauma, although carefully searched for by Dr. Potter during the early days of the illness, and the operation, certainly point towards the ear, as traumatic abscesses are always accompanied either by fracture, wound, or bruise, through which infection enters. It is possible that both factors contributed. The otitis supplied the infecting micro-organisms, and the blow lowered the vitality of the brain, thereby furnishing a soil for their propagation. A similar combination of otitis and blow has been recorded in a case reported by Roughton.[2]

If the ear was the cause, what was the path of infection? Surely not through the lateral sinus, as no symptoms of thrombosis were present. Probably not through the labyrinth, for although prior to the operation no tests of the hearing, etc., were made, yet within a few weeks the hearing was excellent, and the tuning-fork reaction gave no evidences of labyrinthian involvement.

Method of Operating.—The first question to be answered was: Shall the cerebellum be opened directly through the

[1] *St. Thomas's Hospital Reports*, vol. xxiii., p. 160.
[2] The *Lancet*, July 2, 1902, p. 217.

occipital bone, or from the mastoid antrum, following a fistula, if found, and if not, through and along the posterior surface of the petrous portion of the temporal? The latter has been recently adopted, as by this method the dura is exposed over the most frequent superficial point of suppuration, and the operation follows and destroys the original path of infection, whereas, by opening from the occipital, the original focus of infection remains, which may in the future cause further trouble. Although this is true, the operation from the antrum presents several disadvantages which are not encountered by the older method. The opening through the petrous must, of necessity, be very small, too small, in fact, to admit of thorough exploration. The space between the sinus and the posterior semicircular canal varies from 0.5 to *2cm*,[1] which of itself is entirely too limited, but when we consider that this narrow space is situated not only at a considerable depth from the surface, but also at a more or less acute angle, the difficulties will be realized. Moreover, the exploration from the temporal, proceeding from an infected area, as it does, cannot be carried on aseptically, so that if (as has frequently happened) the abscess is not in the cerebellum, but in the cerebrum, the former will become infected by the exploration. And, furthermore, and by no means unimportant in a case of brain abscess, the operation is much more protracted, especially if the antrum has not been previously exposed. Contrariwise, if the opening is made through the occipital it can, and *should*, be of sufficient size to allow of thorough exploration of all parts of the cerebellum by the finger. It can be conducted strictly aseptically, as it goes through an entirely uninfected area, and can be done much more rapidly. The importance of rapidity was recently demonstrated to the writer, whilst assisting at an operation for cerebellar abscess, through the petrous portion of the temporal. The uncovering of the dura was difficult and tedious, as the bone was not only sclerosed, but the sinus was situated so far forward as to afford but little space, and this at almost a right angle. Before the dura had been sufficiently

[1] Okada, quoted by Arnold Knapp, ARCH. OF OTOLOGY, vol. xxxi., p. 103.

exposed (for purpose of exploration), the patient suddenly expired. The autopsy revealed a cerebellar abscess, which, doubtless, would have been found, inasmuch as a fistula just anterior to the part already exposed, existed.

The abscess, however, could have been easily evacuated through an opening in the occipital, in much less time than had been consumed. It would seem then that the rational way to treat a cerebellar abscess is, first to drain it, through a large opening in the occipital bone, and at a subsequent operation remove the source of infection from the temporal, and at the same time make another opening into the abscess cavity from the front, if better drainage can thus be secured.

Exploration of the Cerebellar Substance.—What instrument offers the best chance for success—pus finder, knife, probe, forceps, or finger of operator? All have failed, and all have succeeded. If the pus is very thick, and at a distance from the surface, the entrance into the abscess by the knife may not be followed by evacuation, as happened in the case of the writer, in which, after having found a drop of pus with a large aspirator, the passage of a knife into the cavity was not followed by the expected discharge. But the introduction of the opened blades of a forceps caused the slow escape of very dense pus. If sole reliance had been placed on the knife, as many advise, the abscess would probably not have been located.

In the case reported, exploration was made with the probe, an instrument never to be used, as it possesses none of the advantages of the knife or pus finder. Using the probe as I did, I feel sure that, if the pus had not been of very thin consistence, the abscess would have been missed, or, at any rate, not found until considerable unnecessary damage had been done to the brain tissue. As it was, after two passages of the probe, the *odor* of pus was first discerned, for the cavity *had* been entered, although no pus flowed.

The abscess having been found, how should it be treated? Under no circumstances should the exploring instrument be removed, but another passed alongside of it, in order to

enlarge the opening, and this should not be moved until the entire cavity has been evacuated and the drainage material introduced. If an abscess is partially evacuated, the surrounding brain tissue rolls in immediately from all sides, thereby converting it into a much smaller cavity, which, if once lost, it may be impossible again to find. The importance of this was exemplified in the present case. On the withdrawal of the probe, a closed forceps was passed in the same direction, and, on opening the blades, thin pus flowed freely. Between the opened blades, the little finger was introduced. No limiting membrane was apparent—in fact, no cavity at all, nothing but œdematous brain tissue. I had just repeated the warning given by Ballance, viz.: "Many a case has been lost after pus has been evacuated, owing to failure to introduce the tube in the proper position" (page 341). When the forceps slipped, the pus immediately stopped, and despite several efforts with the forceps and the exploring finger, the abscess cavity was not again found. The explanation of this failure is not difficult. The abscess was probably perforated at its most external and upper part, and almost emptied, its walls collapsing; but as long as the forceps were held in position the external wall was prevented from moving inwards. The moment, however, that the blades slipped, this wall fell in, and the remaining small abscess cavity was then too far inwards and below to be reached by the original tract. The drainage tube that was inserted was not in the abscess at all, but external, and probably above it. The failure to locate the second abscess several days later, by the finger, was due to the non-realization of this fact, and to the natural position that the finger took when standing above the patient, its palmar surface being directed upwards and outwards, while the abscess was below and towards the inner side, next to its less sensitive dorsal surface.

Hernia Cerebri.—The dread of this has too frequently caused surgeons to refrain from making large openings in the dura, for it has been believed that large openings would surely be followed by hernia. However, it is now generally admitted that hernia cerebri, succeeding evacu-

ation of brain abscess, is caused by increase of the intracranial pressure, either from sepsis or hemorrhage. The former is, by far, the more frequent; wherever imperfect drainage exists, a hernia is almost sure to develop, no matter how small the opening. This is confirmed by the present case. At the first dressing after the original operation, a small hernia had appeared, which slowly increased in size until the evacuation of the second abscess, on the opening of which it immediately collapsed, as if it were a cyst, and never again recurred, although no means were adopted to prevent it.

Again, a small opening not only increases the probability of a hernia, but actually prevents its relief when it does occur. I have seen an enormous hernia from a cerebellar abscess protrude through an opening just large enough to admit the little finger. This hernia repeatedly recurred despite partial, and, at last, complete resection. Assuming the foregoing to be true, it is safe to infer that the day of small openings into the dura is passed, as by the small opening the probability of hernia instead of being diminished is greatly increased.

The general surgical principle of making an opening large enough to admit of free drainage, without the possibility of pocketing, has been the cause of many of the failures, in dealing with intracranial suppuration.

Prognosis.—What symptoms and conditions had we in this case to guide us in a probable prognosis? The fact that the abscess was uncomplicated, either by meningitis or thrombosis, as shown by the absence of increased temperature, promised well. The increase of the optic neuritis, after the evacuation of the first abscess, although the patient was apparently improving, was discouraging, pointing towards perpetuation of the intracranial trouble. Optic neuritis should rapidly disappear after evacuation, its increase or continuation demonstrating that the cause within the cranium has not been entirely removed. This was forcibly impressed on me in one of the cases previously referred to; the patient had been operated for thrombosis of the lateral sinus and discharged from the hospital as cured; the optic

neuritis still continued, however, not increasing, but not subsiding. Several weeks later, a hernia cerebri developed, which originated from a cerebellar abscess, doubtless present at the time of the opening of the sinus.

The rapid discontinuance of the suppuration after evacuation pointed towards a favorable outcome, as it demonstrated that the surrounding cerebellar tissue was not infected, as did also the ravenous appetite, the appearance of which is usually coincident with convalescence. On the other hand, the protracted screaming fits, violence, and incontinence of urine at times made us almost despair of recovery.

AFFECTIONS OF THE FACIAL NERVE IN DISEASES OF THE EAR.[1]

By Dr. C. ZIMMERMANN, Milwaukee, Wis.

THE facial nerve becomes, by its course through the temporal bone, largely exposed to ear diseases, in which it frequently participates. Arising from the gray nucleus at the floor of the fourth ventricle, it leaves the medulla with two roots at the posterior margin of the pons, and, acccompanied by the eighth nerve and surrounded by an arachnoidal and pial sheath, enters the internal auditory meatus, which is lined with a prolongation of the dura mater. Through an opening in the upper part, it passes, above and between cochlea and vestibulum, into the Fallopian canal, at the knee of which it forms the geniculate ganglion. Thence it proceeds horizontally in the inner wall of the tympanic cavity, above the oval window, in the projecting ridge of the Fallopian canal, below and in front of the horizontal semicircular canal in the floor of the aditus, where, in a second knee, it bends vertically downward and runs in the posterior wall of the external meatus to the stylo-mastoid foramen. Within the temporal bone, the facial sends off three branches: the large petrosal nerve from the geniculate ganglion, through the hiatus of the Fallopian canal in the Vidian to the spheno-palatine ganglion; the stapedius, through the canal in the eminentia pyramidalis to the stapedius muscle; and the chorda tympani, through its canaliculus, along the inner surface of the *Mt*, between hammer and long process of anvil to the lingual nerve.

[1] Read before the Wisconsin State Medical Society, June 23, 1904.

A predisposition to facial affections may be given by *anatomical abnormalities*, as the frequent occurrence of dehiscences of the Fallopian canal, especially at the projecting ridge, variations of the lumen, and thickness of its wall.

The *congenital palsies* of the facial nerve are the consequence of insufficient development of the petrous bone, and are generally associated with malformations of the external ear, parietal bones, lower jaw, and other parts of the face.[1] In a case of Marfan and Armand-Delille,[2] the trunk of the facial nerve was lacking. In place of the petrous bone there was only an osseous mass, without regular bone structure, no opening of the internal meatus, nor a facial canal. The seventh and eighth nerves were reduced to thin threads, and the facial consisted of a few atrophic cells, all secondary to the original disturbance in the petrous bone. Stern, however, contends that it was due to an arrest of development of the nervous apparatus, as it does not fit into the two well-known groups of congenital facial paralysis, viz.: (1) bilateral paralysis, with simultaneous paralysis of the sixth nerve and other congenital malformations; (2) unilateral paralysis, mostly associated with sensitive and vasomotor disturbances.

The *family type* of facial paralysis, associated with hemiatrophy of the face, asymmetry of the bones of the skull and face, atresia of the meatus, rudimentary auricle, is attributed by Sarbó and Sugar[3] to stenosis of the Fallopian canal, owing to anomalies in the development of the petrous bone, *i. e.*, hypoplasia.

Facial paralysis was sometimes observed in affections of the *auricle and external meatus*, but more as a result of reflex, as *e. g.*, auricular herpes zoster,[4] otitis externa (Treitel), or ceruminal plugs (Böke, Czaig). Epidermic plugs, however, may produce facial paralysis by pressure if the nerve is laid bare by atrophy and absorption of the walls of its canal.[5]

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[1] Souques, Heller, Lévi, and H. de Rothschild. *Arch. f. Ohrenheilk.*, lx., 1904, pp. 308, 309.
[2] *A. f. O.*, liv., 1901, p. 161.
[3] *A. f. O.*, lx., pp. 58 and 123.
[4] Politzer and Tomka, *A. f. O.*, lix , 1900, p. 28.
[5] Hessler, *A. f. O.*, xlii., p. 12; and two cases of Kirk Duncanson and Weil.

Gellé[1] described ten cases of acute subcutaneous phlegmon and œdema around the ear, forehead, and neck, with resolution after eight to twelve days without suppuration, but facial paralysis in some of them, with symptoms of deep-seated affections of the ear, probably due to osteo-periostitis of the Fallopian canal or old purulent processes.

Comparatively more frequently occurs facial paralysis in *acute affections of the middle ear*, in serous and mucous catarrh, acute serous and purulent otitis media, if, in dehiscences of the walls of the facial canal the nerve is exposed to direct pressure from the swollen mucous membrane of the tympanic cavity or accumulated exudations. Or the inflammation may be propagated to the neurilemma, with resulting perineuritis, through the vessels, perforating the bone, or by compression of the nerve by the simple congestion of the periosteum or the engorged stylo-mastoid artery in the common canal.[2] This may be the case even in light forms, in which the subjective symptoms of inflammations of the ear may fail to attract attention. The relapsing facial paralysis in persons with predisposition to acute angina or naso-pharyngitis, with consecutive acute otitis media, has probably its origin in the latter. Undoubtedly many of the so-called rheumatic affections of the facial nerve were of otogenous origin. Therefore the examination of the ears should never be omitted in such cases, on account of the prognostic and therapeutic importance, since paracentesis may at once relieve the affection.[3]

On the other hand, not every facial paralysis, in a patient who has an ear trouble, is due to the latter, as the following case of a rheumatic palsy will show:

S. E., twenty-five years old, had chronic aural catarrh from her sixteenth year, after scarlet fever. On May 17, 1903, after a week of hard work and sleeping in a room with three windows open the night before, although not directly exposed to draught, she noticed in the morning and all day a peculiar sensation in her

[1] *A. f. O.*, xli., p. 154.
[2] Lannois, *A. f. O.*, xli., p. 147.
[3] Tomka, Bérard, Deleau, *A. f. O.*, xlix., p. 29; de Pouthière, *C.-Bl. f. Chir.*, 1899, p. 1237; Delsaux, *A. f. O.*, lx., 1903, p. 147; Damieno, *A. f. O.*, xlvi., 1899, p. 280.

tongue—*i. e.*, she had no taste—and, toward evening, also in the right eye. The next day the right side of face was paralyzed and she experienced pain in face and ear for a week, being very sensitive to loud sounds. Faradic treatment after six months had no effect. About this time contracture had set in, for which she applied massage. After a year this contracture still persists and she cannot move that side of the face as well as the other; especially can she not chew well on that side.

The relative frequency of facial paralysis in acute purulent otitis media in children is due to the imperfect formation of the osseous wall of the facial canal and requires opening of the mastoid as early as possible.[1] Knapp saw [2] facial paralysis in acute purulent otitis media and mastoiditis, which disappeared by operation. In a case of Jack,[3] acute purulent otitis media had led to caries of the Fallopian canal with facial paralysis, causing severe pain, but without involving the mastoid process. Entering towards the Fallopian canal, 6*mm* inwards from the antrum, a small cavity was reached, filled with pus, the cleaning of which removed the pain and cured the affection. Panse [4] found in a post-mortem of a suppuration of the labyrinth after acute otitis media the auditory nerve destroyed by pus and the facial nerve infiltrated with round cells.

It will be readily conceived that the pathological changes in *chronic purulent otitis media* will give rise to facial paralysis. Here we not only find similar conditions, as mentioned under the acute form (propagation of the inflammation of the tympanic cavity through the nervus stapedius, the artery, or the chorda tympani, conveyance of pus through the eminentia pyramidalis, or from the mastoid through the stylo-mastoid foramen), but also the mucous membrane with the closely underlying periosteum may be destroyed, affecting the bone and finally the nerve. Slight facial paralysis is frequently met with in chronic ear suppurations, characterized by greater shallowness of the naso-labial fold and

[1] R. Lake, *C.-Bl. f. Chir.*, 1895, p, 814.
[2] *Z. f. O.*, xxviii., p. 201.
[3] *Transact. of Amer. Otol. Soc.*, vol. xi., 1896.
[4] *A. f. O.*, 1898, xlv., p. 124.

a diminished energy of the facial muscles of the corresponding side. It thus may be easily overlooked, if not especially searched for.

According to statistics by Schwabach, facial paralysis in *tuberculous* otitis media is eighteen times more frequent than in the simple form, and is an ominous symptom, as it generally precedes death shortly. The mastoid may externally appear scarcely changed, while an extensive destruction has taken place in the interior, so that the facial nerve may be paralyzed in an apparently early stage of the ear affection, and thus be of diagnostic and prognostic value.[1] Piffl[2] found miliary tubercles in the tissue of the denuded facial nerve, while in a case of Manasse[3] complete facial paralysis with total deafness was caused by a solitary large tubercle of the pons which had damaged the auditory and facial nerves in the internal meatus.

Syphilis may also create facial paralysis by compression of the nerve at the cranial base, by gummatous meningitis, or gummata in the Fallopian canal. The paralysis which may occur in the early stage, a few weeks after primary infection, is very likely due to neuritis.[4]

The most frequent cause of facial paralysis is destruction of the Fallopian canal by *caries* and *necrosis of the petrous bone*, subsequent to chronic purulent otitis media, either genuine or induced by infectious diseases, as, besides tuberculosis and syphilis, by diphtheria, scarlet fever, measles, influenza, typhoid, leukæmia, epidemic cerebro-spinal meningitis.[5] Here the pus breaks through the carious walls of the canal, or a sequestrum compresses the nerve, or lacerates it during exfoliation.[6] Gerber[7] found out of 90 cases of necrosis of the labyrinth, published up to 1903, reports on the facial nerve only in 65. In 77 % the facial nerve was paralyzed. Bezold saw it in 83 % of his cases.

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[1] Milligan, *A. f. O.*, xlvii., 1899, p. 222.
[2] *A. f. O.*, 1900, xlviii., p. 301.
[3] *A. f. O.*, 1896, xli., p. 62.
[4] Oppenheimer, Boix, Goldflam, Balzer, and Faure-Beaulieu, *C.-Bl. f. Chir.*, 1903, p. 501; and Graenicher.
[5] Tomka, p. 32.
[6] Buhe, *A. f. O.*, lvii., p. 101.
[7] *A. f. O.*, lx., 1903, p. 16.

G., however, thinks that the number of cases of lasting facial paralysis corresponds with the number of extensive necroses of the labyrinth. It generally follows the first attacks of vertigo after one or a few months, and is considered as a symptom of demarcation and migration of the sequestrum. In two exceptional cases, however,[1] the paralysis set in simultaneously with the suppuration.

New formations of the hearing organ may be further causes of facial paralysis, developing in the course of chronic purulent otitis media, as polypi, cholesteatoma, exostosis, and hyperostosis, or tumors of the petrous bone or of the cranial base, growing towards the internal meatus. In the last the facial paralysis is accompanied by nervous deafness and pontile and cerebellar symptoms.

If the facial canal is opened, the suppuration of the middle ear may be propagated to the posterior cranial cavity along the canal through the internal meatus, or to the middle cranial fossa through the hiatus of the Fallopian canal. Vice versa, *otitic cerebral complications* may damage the intracranial portion of the facial nerve, or its centres, by hemorrhages from disturbances of circulation, induced by the former, *e. g.*, thrombosis of the sinus. The complex of symptoms thus arising and the manner in which the facial nerve participates may help to determine the localization of the process. Koerner groups the facial paralysis in abscess of the brain under the following causes: 1. Lesion within the diseased temporal bone (peripheral homolateral paralysis). 2. Compression of the entrance into the internal meatus by cerebellar abscess (homolateral paralysis). 3. Distant action of an abscess of the temporal lobe on the internal capsule (crossed central paralysis). 4. Distant action of a cerebellar abscess on the pons. 5. Focal symptoms of an abscess of the pons. In both these cases, central homolateral, crossed, or bilateral paralysis.

Traumatism may produce facial paralysis, either directly by stabs, shots, foreign bodies, by fractures of the base of the skull, involving the temporal bone and the facial canal, or indirectly by subsequent hemorrhages or suppurations,

[1] Gerber and Herzfeld.

or by caustic and thermic injuries. The seat of predilection of traumatic fissure is the region of the hiatus of the Fallopian canal.[1] The facial paralysis occurs more frequently in *fractures* perpendicular or oblique to the axis of the pyramid than in those parallel to it; it follows the fracture immediately and is complete. According to Vialle,[2] the secondary palsies are exceptionally rare—*i. e.*, those which, at the earliest, set in the following day, and may develop gradually or suddenly, be complete or only partial. In two of his cases, facial paralysis, which had set in on the second day, healed after twenty-seven and thirty-eight days, respectively. In such cases interstitial hemorrhages were found most frequently in the descending portion of the facial nerve.[3]

I observed a secondary facial paralysis, caused by the pressure of extravasated blood, perhaps from a fracture which apparently did not involve the facial canal, or from a severe contusion, in a man, aged fifty, who, on November 14, 1901, fell from the platform of an electric car on the right side of his head. He lost consciousness, but was told that much blood came out of the right ear, and, from that time, suffers from vertigo and deafness. On November 20th I saw him for the first time and found R meatus filled with dried blood and macerated epidermis. Vertical rupture of lower portion of *Mt.* (Hearing: watch not at all, tuning-fork better in right ear over mastoid. Loud voice at one foot; Rinné negative.) November 21st, quite a profuse sanguinolent discharge. November 22d, *paralysis of right facial nerve*, more pronounced in lower branches than upper. The right eye can be closed, but not as tight and energetically as the left. (*Ophth.:* myopia, conus all around; no other changes.) November 24th, perforation closed. *Facial paralysis complete.* Catheterism improves hearing considerably. November 30th: details of *Mt* can be discerned. Hearing is improving under catheterism, so that the patient gives up treatment and commences to work.

I did not see him again until May 22, 1902, when I found the *facial paralysis entirely cured* and his *hearing normal.*

[1] Zaufal.
[2] *A. f. O.*, lx., 1904, p. 308.
[3] Barnick, *A. f. O.*, xliii., 1893, p. 37.

The facial nerve may be injured in *various operations on the ear*: in extractions of foreign bodies wedged into the tympanic cavity; in removal of polypi and granulations by the snare or sharp spoon, if the walls of the Fallopian canal are defective; in cauterizations with nitrate of silver or chromic acid; in excision of the ossicles, if the anvil does not readily follow and an infraction of the near facial canal is produced by applying too great a force to the anvil hook; in concussion by use of the hammer in mastoid operations.

If, in *opening* the *mastoid process*, the chisel is used beyond a certain depth, the facial canal may be injured. In this respect a great progress has been made, besides other advantages over the simple opening, by the method of Stacke, who taught how to avoid the facial nerve. Schwartze,[1] however, opposes the assertion of Stacke, that an injury of the facial nerve by his method of operating is impossible, if the Fallopian canal is intact. It is possible, without touching the medial wall of the tympanic cavity, in the descending portion of the Fallopian canal, which sometimes shows such individual variations in its course that it may be encountered where least expected. Schwartze, in a recent paper,[2] distinguished between two extremes—a steep or very oblique trend ("Steilverlauf" and "Flachverlauf"), and an intermediate, which he calls "Schraegverlauf." The more the facial canal approaches a steep course, the less dangerous is the operation; but the more so, the more laterally the canal runs towards the meatus. Injury occurs easiest, if, in chiselling away the posterior wall of the meatus, a too horizontal direction is pursued, instead of one more upward and backward. The danger is greatest when the mastoid disease extends below the horizontal plane through the floor of the aditus ad antrum. While here the facial lies far inward from the upper portion of the tympanic margin; it passes in its downward course more or less so far laterally that it can come not only into the plane of the lower part of the tympanic margin (Steilverlauf), but even far laterally from the lower part of the tympanic margin (Flachverlauf). Another possibility of injuring the

[1] *Handbuch*, ii., p. 825.

[2] *A. f. O.*, lvii., 1903, p. 96.

facial nerve is more or less favored by its canal approaching more or less the surface of the posterior wall of the meatus. In one of Schwartze's specimens the facial directly touched the wall of the meatus, in another one it kept *1cm* distant from it. The facial can come so near to the surface of the mastoid process that it may be injured by the first strokes of the chisel. By what these anomalies are caused and from what symptoms they may be anticipated before the operation, are still to be elucidated by further researches.

Streit[1] recently described a case of oblique course with unusually marked displacement of the descending portion of the facial nerve towards the surface of the mastoid process, which throws some light on this question. The facial crossed the upper part of the tympanic sulcus, with the posterior periphery of which its farther course formed an acute angle downward and forward. The sulcus was very oblique, without marked vertical inclination. S. attributes to this latter condition the displacement of the nerve into the posterior wall and advises a certain caution in removing the posterior wall, if the plane of the *Mt* is *very oblique*.

B. A. Randall,[2] from his mensurations of a great number of skulls, came to a somewhat different conclusion, viz., "that the descending course of the facial nerve to its stylo-mastoid exit is, in all cases studied, almost exactly vertical and crosses the oblique plane of the *Mt* some *3mm* back of the middle of the posterior margin of the annulus. Therefore, in removing the back wall of the meatus we should aim to cut a little below the tympano-mastoid suture if we would keep in safe territory."

Schwartze recommends the following *precautions*, with regard to these abnormalities: Careful slight strokes of the chisel, which must form an acute angle with the posterior wall, never a right angle. Then the facial cannot be cut perpendicularly. The chisel must act as bone knife, not as lever, and only with the centre of its groove for removing the bone in lamellæ.

Stacke, however,[3] concedes that facial paralysis may be

[1] *A. f. O.*, lviii., p. 233. [2] ARCH. OF OTOL., 1903, p. 144.
[3] *Die operative Freileg. der Mittelehrraeume*, pp. 191, 193.

unavoidable in caries of the Fallopian canal. In such cases he, in concordance with Schwartze,[1] Moure and Liaras,[2] Stewart,[3] Panse,[4] and others, does not shun a lesion of the nerve, in the interest of removing all diseased parts.

These conditions I found in the following cases:

March 16, 1901.—M. R., a man, aged forty-three, came to me on account of a very profuse purulent discharge of right ear with excruciating headache on the same side. The otitis media had developed five weeks ago after influenza. Perforation at upper posterior quadrant of *Mt* through which a granulation projects, pus coming from above. Mastoid not swollen nor painful. Bone at posterior portion of annulus tympanicus feels rough. The muscles of the corresponding side of the face show lack of energy.

March 17*th.*—Opening of mastoid, which is filled with granulations. Perforation of *Mt* enlarged and granulations removed. The patient felt greatly relieved and had no headache. March 23d, at the first dressing, the mastoid wound was clean, but the ear contained pus and he had some pain in ear, neck, and jaw. There was no open communication between ear and mastoid. Dressed every day, but since the discharge from ear continued, the *radical operation* was performed March 26th. The lateral wall of aditus and the innermost portion of meatus formed a loose large sequestrum which showed the lateral half of the facial canal. Behind it, quite an accumulation of pus had taken place. The tegmen tympani was healthy. Complete facial paralysis, although no twitchings were observed during the operation. Undoubtedly it was torn by the sequestrum when this was extracted. At the dressing the next day not a drop of pus was found. Everything went well until, on April 4th, the patient suddenly complained of pain in left leg during the night, had a chill at 10 A.M. and severe headache, temp. 99.5°. In the afternoon he lost consciousness and presented the picture of acute purulent leptomeningitis, of which he died the next evening. A post-mortem examination was not consented to.

Since all the diseased parts had been removed, the apoplectiform fatal meningitis was very likely metastatic,

[1] *A. f. O.*, lvii., 1903, p. 96.
[2] *A. f. O.*, xlix., 1900, p. 86.
[3] *A. f. O.*, xlvi., 1899, p. 59.
[4] *A. f. O.*, lviii., p. 190; xlv., 1898, p. 124.

analogous to a great number of similar cases, published by Ray, Panse, Knapp, Abbe, Kretchmann, Koerner, Zaufal, and Piffl.[1]

Second case:

A. P., aged seventeen, came to me January 5, 1893, with chronic purulent otitis media and polypi of left ear, caries of mastoid with intense swelling and fistulæ, severe pain, fever, and occasional twitchings in the corresponding side of the face. At the operation the following day, a very large and deep cavity, filled with granulations, was opened. The posterior wall of the meatus was necrotic and had to be removed, which resulted in complete paralysis of the left facial. Good recovery.

January 27, 1894, he can close the left eye, but, on irritation of the conjunctiva, it weeps more than the right eye, which showed a restoration of the lachrymal fibres of the facial nerve.

With regard to the *symptoms of facial paralysis*, only a few remarks may be permitted.

Obliquity of the *soft palate* is no evidence of facial paralysis, as it is not uncommon in persons who have no facial palsy. Gowers, *e. g.*, never observed a corresponding defect of movement in the palate, and from the physiological and pathological investigations of Vulpian, Lermoyez, Réthi, Eulenburg, and de Pouthière, we know that the palate is innervated by motor branches of the fifth, tenth, and eleventh nerves.

The *pain in the face*, generally felt after the onset of facial palsy, was formerly attributed to assumed sensitive fibres of the facial nerve, but is now ascribed to a simultaneous, probably neuritic, affection of branches of the fifth nerve.[2]

If the facial nerve is diseased between the origin of the chorda tympani and the geniculate ganglion, *taste* is lost in the anterior part of the tongue on the affected side. From recent studies in the clinic of Koerner, Schlichting[3] concludes that the chorda fibres of taste of the anterior part of the tongue show an individual variation of occupying $\frac{1}{3}$ to $\frac{1}{2}$

[1] *A. f. O.*, li., 1901, p. 172.

[2] Oppenheimer, Hammerschlag, *A. f. O.*, xlv., 1; Hofmann, and v. Frankl-Hochwart.

[3] *Z. f. O.*, xxxii., 1900, p. 307.

of the area of the tongue. The posterior part of the tongue and the soft palate are supplied from the tympanic plexus. All nerve fibres conducting the sensation of taste to the centre pass through the tympanic cavity, no matter whether they finally reach the brain through the fifth or ninth nerves.

If the facial nerve is affected at or above the geniculate ganglion, the secretion of the *lachrymal gland* ceases. Goldzieher[1] has shown that the facial nerve innervates the lachrymal gland by fibres which course in the large petrosal nerve (to the spheno-palatine ganglion, by the subcutaneous malæ of the second branch of the fifth nerve, and the constant anastomosis with the lachrymal nerve to the lachrymal gland), and causes reflex and emotional weeping, while the regular moisture of the surface of the eye is secreted by the conjunctiva.

Tribondeau[2] proved, by cutting the facial nerve in animals, that it is the only innervator of the lachrymal gland, and his results were confirmed by Laffay.

Facial paralysis, occurring during an operation, is generally not noticed as long as the patient sleeps, both eyes being equally closed. Herzfeld[3] maintains that closure of the lids during sleep is not always brought about by active contraction of the orbicularis, but passively by relaxation of the tonus of Müller's muscles and the smooth muscular fibres of Tenon's capsule, both supplied by the sympathetic nerve, analogously to the contraction of the pupil during sleep from relaxation of the dilator, which is also supplied by the sympathetic.

As to the *prognosis of facial paralysis* after operations, there is some discrepancy of opinion. According to Lermoyez,[4] a paralysis following immediately an operation is incurable, those occurring after one or a few days are caused by grazing the nerve with the instruments, or pressure from blood- or wound-secretion, or too tight packing, and are curable (Koerner observed this in three cases, also Gruening,

[1] *A. f. O.*, Aug. 28, 1899.
[2] *Jrl. de méd. de Bordeaux*, 1895, No. 44.
[3] *Berl. klin. Woch.*, 1901, No. 35, p. 904.
[4] *Therapeutique des maladies de l'oreille.*

Bacon, Dench), while Stacke says that a facial paralysis created by sharp instruments is very rarely irreparable. Out of his one hundred radical operations published in his book, facial paralysis occurred in four, but was cured in all; out of Moure's [1] thirty-four operations, it occurred four times and healed in all. Castex [2] observed restoration in three out of four cases. Barnick,[3] Botey,[4] Schroeder [5] had, out of 130 ossiculectomies, twice facial paralysis, which, like in all cases previously published, recovered in about six weeks without treatment. He thinks that the paralysis is caused by infection. A certain prognostic information on facial paralysis in general is obtained by electricity. If at the end of ten days the irritability of the nerve is not below normal, the face will probably be well in a few weeks. If, on the other hand, at the end of a fortnight the irritability of the nerve is absolutely lost, the paralysis will certainly last for several months.[6]

The *treatment* of facial paralysis from ear disease coincides with the treatment of the latter, and, as shown above, must be chiefly surgical, aided by electricity, if there is no contracture. Brieger [7] observed nine facial paralyses in 169 radical operations. One case illustrated the possibility of regeneration of the nerve six years after it was cut in simple opening of the antrum, by totally removing all diseased parts and curing the affection.

I may here mention the following case which I described in the ARCH. OF OTOL., xxiv., No. 4:

A man, aged twenty-six, had a large cholesteatoma of right middle ear and posterior cranial fossa with complete facial paralysis. Radical operation November 1, 1898. The inner portion of the posterior wall of the meatus formed a loose sequestrum which presented a semi-canal, apparently the lateral portion of the Fallopian canal. The after-treatment up to complete

[1] *C.-Bl. f. Chir.*, 1897, p. 110.
[2] *A. f. O.*, xlix., 1900, p. 278.
[3] *A. f. O.*, xlii., p. 112.
[4] *A. f. O.*, xlv., p. 73.
[5] *A. f. O.*, xlix., 1900, p. 21.
[6] Gowers, *Manual of Nervous Diseases*, ii., p. 346.
[7] *A. f. O.*, xlix., 1900, p. 282.

epidermization, lasted six months. The facial paralysis was cured; he can close his right eye completely, only the folds of the face on that side are not as deep as on the other.

For *incurable facial paralysis* Faure and Furet devised, in 1898, a new treatment by uniting the distal end of the facial with the external branch of the spinal accessory at its entrance into the sterno-mastoid muscle. This method has been further pursued by Kennedy, Breavoine[1] Korte, Cushing, Frazin, Spiller, who favored the hypoglossal nerve, Ballance, and Stewart.[2] The results were restoration of the normal muscular tone, improvement in the symmetry of the face, and restoration of voluntary control of various individual muscles.

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[1] *C.-Bl. f. Chir.*, 1902, p. 796.

[2] *Prog. méd.*, March 1, 1904.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY; MEETING OF MAY 24, 1904.

By Dr. ARNOLD KNAPP, Secretary.

THE PRESIDENT, DR. EMERSON, IN THE CHAIR.

Dr. Brandegee asked the opinion of the members of the Society whether they had heard of any **fatal cases following skin grafting in the radical operation.** He had been told that some fatal cases had occurred in the city. He was very anxious to know the particulars, inasmuch as they had been doing a great deal of skin grafting at the Infirmary and were very much impressed with the advantages of this method. Not only was the healing very much shortened, but the hearing was improved.

Dr. Gruening spoke of a case which he had heard of where a graft had been placed directly upon the sinus. Death subsequently occurred, due to pyæmia, and it was supposed that sinus thrombosis was induced by infection from the skin flap. He himself was in the habit of placing a skin graft only over the opening of the Eustachian tube, and found this to be a very important step to shorten the healing process.

Dr. Whiting had had only favorable results from skin grafting, though he was not convinced that the healing had been very much shortened.

Dr. Arnold Knapp thought that the fatal termination of these cases could hardly be ascribed to the grafting procedure, as unquestionably disease must have existed beyond the seat of the primary operation, and the graft had probably not acted in any other way than tight packing. It is of course well known that a graft placed upon an unhealthy surface does not take.

Dr. GRUENING thought it was questionable whether a graft should be placed upon the dura or upon the sinus.

Dr. KIPP spoke of a case of **sepsis from empyema of the nasal accessory cavities complicated with acute Bright's disease.** The patient, forty-five years of age, came to him complaining of deafness. The right ear had been deaf for some time, the left had become affected recently. On examination, the right drum was thickened, and looked like skin and protruded slightly. In the left the appearances were those of an acute otitis media. Paracentesis evacuated a milky fluid from the right, serous fluid from the left. The patient also suffered from an occlusion of the nose due to hypertrophic rhinitis. He improved for three weeks, then began to look badly. His temperature varied between 99° and 103°. This continued for two weeks, without any symptoms of mastoid involvement, the right ear discharging slightly, the left considerably. The man then grew worse; at one time the pulse went down to 45, temperature rose to 103°. His nose was examined by a well-known rhinologist, who found ethmoid disease present, but drainage was free. As the temperature continued, Dr. Kipp opened the left mastoid and found pus in the antrum and mastoid—no disease of the lateral sinus. Two days later he opened the right mastoid but found no pus. The patient became very much worse some days after the operation, and a week later developed an acute attack of Bright's disease. He had several attacks of bleeding from the nose. The face became swollen, the ocular conjunctiva œdematous. The patient died of œdema of the lungs. Autopsy revealed a perfectly normal brain; the dura and the venous sinuses were unaffected. There was no discoloration of the inner surface of either temporal bone. The roof of the accessory nasal cavities was removed and all of the cavities of both sides were found lined with thick pus; both sphenoidal sinuses were filled with pus. There had been no symptoms pointing to the nasal complication beyond the discharge from the nose and the fever. The sella turcica was soft and hemorrhagic. The eyes were normal.

Dr. BERENS thought that in the presence of pus and sepsis, without any indication of mastoditis, the nasal sinuses should have been opened, especially in conjunction with œdema of the conjunctiva. He had recently operated upon fourteen cases of sphenoid disease and had found the ethmoidal and sphenoidal sinuses affected in all.

Dr. Harris thought this brought up again the interesting connection between diseases of the accessory nasal cavities with diseases of the ear.

Dr. PHILLIPS thought that Dr. Berens's statement should perhaps be modified, inasmuch as pus coming posteriorly from the nose indicates either ethmoid or sphenoid diseases, or both.

Dr. BERENS replied by saying that in his experience they were always combined.

Dr. PHILLIPS remembered having seen many cases where the ethmoid alone was affected.

Dr. KIPP emphasized the fact that at the autopsy both frontal sinuses were also found involved, though no symptoms of their involvement were present before death.

He also spoke of the autopsy of a case of frontal-sinus disease complicated with pneumonia, where the autopsy showed that all the sinuses on one side of the nose were converted into one large cavity.

Dr. COWEN spoke of a patient who had received some intranasal treatment and exhibited distinct pyæmic symptoms. An exophthalmos was present, with all the symptoms of an orbital cellulitis. At the autopsy, all of the nasal cavities were found normal, but the cavernous sinus was thrombosed.

Dr. PHILLIPS spoke of the present **epidemic** of **cerebro-spinal meningitis.** He said that there were between 50 and 100 fatal cases a week, according to the Board of Health reports, and without question we would find a great many cases of deafness following this present epidemic. He had just seen a very recent case. He asked the opinion of the Society as to what could be done in the early stages of the aural complication.

Dr. GRUENING remembered the epidemic which occurred thirty years ago, when a great number of cases were observed and treated in the New York Ophthalmic and Aural Institute. The deafness was treated with considerable enthusiasm by electricity, until an autopsy showed that the auditory nerve was infiltrated with pus, *i. e.*, an actual purulent neuritis, showing that no treatment could be of any avail.

Dr. PHILLIPS mentioned that lumbar puncture was generally practised in these cases, and that the meningococcus was obtained. He thought this of some interest, because these organisms when met with in the mastoid were usually more or less benign.

Dr. KIPP said that cerebro-spinal meningitis was liable to cause any kind or variety of aural lesion, just as in the eye.

Dr. H. KNAPP thought that a purulent inflammation of the labyrinth was the pathological change, and that the patient was always totally deaf.

Dr. GRUENING recently examined fifteen cases at the Mount Sinai Hospital. In one case one eye was completely blind, with no fundus changes. In the other eye, though the vision was reduced, the field for white and colors was normal. A paralysis of all the external and internal muscles existed.

In three other cases he had found optic neuritis. There were no other symptoms in the other patients. The ears were found normal in all.

Dr. H. KNAPP drew attention to the fact that the deafness was generally binaural, while the eye lesion might be single, either in the optic nerve or a metastatic choroiditis, when the eye always became blind.

Dr. KIPP thought that the staggering gait which remained so long after cerebro-spinal meningitis was unusually typical of the disease.

Dr. WHITING exhibited a temperature chart of a pyæmic character of a patient one year of age whom he had seen on the third day of the disease. Both ears were suppurating. Paracentesis had been made. There was a slight sagging of the canal wall. He advised enlarging the paracentesis opening. The temperature then varied between 106° and 98.5° daily for ten days, a period which surely would speak for early operation. The high temperature was sometimes in the morning and sometimes in the afternoon. There was no excessive discharge from the ear, bacteriologic examination was negative, pulse varied between 100 and 150. He refused to operate, because the child to him never appeared to be really very ill. There were no special sagging of the wall and no mastoid symptoms. The child got well. The blood was not examined.

Dr. GRUENING had had a similar experience after a radical operation on a child, when the temperature varied between 106° and 98°. On examining the blood, the plasmodium was found present, which accounted for the irregular fever, though unquestionably it can be produced by septic absorption from the tympanum.

Dr. COWEN said that the diagnosis of a disease spoken of as

"gland disease" was becoming quite popular among physicians and was apt to confuse the ear symptoms. It always occurs after infectious diseases. He remembered a case when after pneumonia the ears became involved, the mastoids were somewhat tender, and the drums red. The patient recovered after three weeks. The cervical glands and spleen were enlarged.

Dr. HARRIS spoke of the great similarity of the cases of irregular temperature, like the one which Dr. Whiting reported, to those of jugular-bulb thrombosis which Dr. McKernon had recently reported to the Society.

Dr. TOEPLITZ spoke of the connection of the **supramastoid glands with ear disease.** He had recently observed a case where on one side the supramastoid gland was involved and the underlying mastoid was also diseased; another case where the gland was involved secondarily to a cellulitis of the scalp without any mastoid development; and thirdly of the affection of this gland in the cases known as German measles. He said that clinicians often found a swelling of this gland as a forerunner in the beginning of a rubeola.

Dr. GRUENING spoke of the case of a child two months old, with apparently a suppurative gland situated somewhat lower on the mastoid than usual, with a temperature of 102°. After evacuating a glandular abscess, he found the periosteum clean, and on dividing it a part of the mastoid cortex was lifted up and an enormous abscess cavity was discovered. On the other side apparently only a suppurating gland existed. He remembered, nevertheless, the frequency of binaural affections of this kind, and also operated on the mastoid and found it very much affected.

Dr. ADAMS spoke of a case of ear trouble after measles in which the temperature ranged from 104° to 98° and where the glands under the mastoid were involved. The case got gradually well.

Dr. HERMAN KNAPP spoke of two children whom he had had in charge, who from time to time exhibited pyæmic symptoms. He thought that they would both get well, and said that in his experience sinus thrombosis was very rare in children.

Dr. GRUENING replied that he had observed during the past winter three cases of sinus thrombosis in children, one of two and the remaining two of three years of age.

Dr. SHEPPARD remembered having operated upon three children with sinus thrombosis, who were all under the age of

seven, where the jugular vein was ligated. The patients all recovered.

He also spoke of a patient of fifty-five years of age who came to him suffering with a violent middle-ear inflammation. The membrane was immediately freely incised, but as there was no amelioration of symptoms after twenty-four hours, operation was recommended. The next day the pain and tenderness had almost disappeared, but there was very great general depression; this latter rapidly increased, and the man became markedly septic, with, forty-eight hours later, a temperature above 105°, with moderate variations, free sweating, but no chills. These symptoms continued to the time when he finally consented to operation—exactly a week from the original paracentesis. He had expected that the lateral sinus was involved and was prepared to expose it, but on opening the mastoid the diseased process was so extensive, and the patient bore the operation so badly, that he contented himself with a thorough clearing out of the mastoid and adjoining occipital cells; the expectation was that in twenty-four or forty-eight hours he would continue the operation, but within twenty-four hours the temperature dropped to normal and the patient made an uneventful recovery.

Dr. GRUENING spoke of a case of **sinus thrombosis** in a girl of sixteen years of age whom he had formerly treated for a discharge from the ear. He had removed a carious hammer and some cholesteatoma. The discharge ceased, and, as she had no symptoms, he asked her to report if she had any further ear trouble. He was recently called to see her. She had been ill for two weeks, had had a chill, and vomited, with high fever, and involuntary urination. She had been treated for various ailments until the family remembered that she had had trouble formerly from her ear, and so he was called in. He found the patient to be distinctly septic, with a pulse of 160, with optic neuritis, no discharge from the ear, but a slight puffiness above the auricle. At operation a fistula was found below the suprameatal spine from which a large quantity of pus was discharged. This led into a large cavity within the mastoid. After cleaning out the cavity, he found that the outer wall of the sinus was defective and appeared to be shut off above and below by a firm thrombus. He removed the thrombus below and restored the circulation, but had to proceed as far back as the torcular to produce bleeding from the other extremity. The thrombus in this part of the

lateral sinus was found purulent in places. In one place in particular the disintegration of the thrombus looked exactly like brain tissue. The antrum was cleaned out and the operation completed. The patient has recovered.

Dr. KIPP spoke of the sloughing of the outer wall of the sinus as occurring in the form of a spontaneous cure of sinus thrombosis. He spoke of a patient with a subcutaneous abscess back of the auricle, which led down into a large cavity in the mastoid containing some pus. The outer wall of the sinus was found defective, and the sinus both above and below was firmly closed off. The patient showed no evidences of pyæmia, and made a perfect recovery in a short time. The process could be regarded as a spontaneous cure.

Dr. WHITING thought that this condition of deficient outer wall could not be very rare. He himself had seen five cases where the parietal wall of the sinus had disappeared. This had always occurred in the part of the sigmoid sinus between the two knees.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

MEETING OF APRIL 14, 1904. DR. H. KNAPP IN THE CHAIR.

EXHIBITION OF NEW INSTRUMENTS.

Dr. BRYANT submitted a new **long-handled gouge** with curve forward near its point. This gouge is commonly used in wood-carving, and is known as the front-bent gouge. The instrument can be used with a mallet in the ordinary way, or it can be worked with the hand alone. It is useful in mastoid work, for it facilitates the removal of the hard structure lying within the process, the curve in the instrument allowing its use in places not readily reached by a straight instrument. It is also useful in cutting over the outer table of the skull over the mastoid process and, instead of the trephine, to perforate the calvaria. The perforation of the outer table is made by using the instrument as a gimlet until a shallow cup is formed. As the hole deepens, the instrument is swung more widely, cutting the sides and bottom of the opening at the same time. The instrument is not equal in efficiency to the rongeur forceps for enlarging a hole, nor is it as effective as a curette in removing the pneumatic cells of the mastoid, but it is more eminently adapted for precise work in localities requiring cautious manipulation, for it allows the operator to exert considerable force with precision at the desired point. It also has the advantage of doing away with blows of the mallet in cranial work.

PRESENTATION OF CASES.

Dr. TOEPLITZ presented a case of **extradural abscess, simulating cerebellar abscess; operation; recovery.**

The patient was a man, twenty-two years of age. He was

taken with cold and sore throat on December 14, 1903. On the 15th he had pain in the left ear, and on the 16th Dr. Toeplitz saw him at the Post-Graduate Hospital, where he performed a paracentesis. The pain was not relieved by this measure. When he saw him again, on the 19th, the patient complained of pain in the left mastoid. He was then sent to the hospital. There was considerable discharge, which was not purulent in the beginning. The ice coil was used for two, and the hot-water bag for three days. The temperature, which for four days had been 100.6°, dropped and remained at 99° for three days. On the seventh day after his admission to the hospital, the patient's pulse was 74–80. On that day, being convinced that there was some caries going on in the mastoid (although he had no positive sign for operation), the Doctor operated. The antrum was filled with viscid fluid. The tip and the lower posterior mastoid were carious, and there was a large mass of dirty granulations in the tip and on the posterior wall of the mastoid. No pus was found in the mastoid at the time. The mastoid was entirely shelled out, only the inner plate being left. On the 27th, the temperature rose to 103.8°, and the pulse was 80; on the next day (the 28th), the temperature went down to 99.2°, pulse 80; on the 29th, the temperature was 102.6°, pulse 80 ; on the 30th, 100.1°, pulse 80. On the sixth day, the temperature was normal. The patient vomited during the night and complained of pain in his arms and legs. The blood was examined for malaria, but the result was negative. Widal test negative. There was pain in the abdomen and considerable hemorrhage from the intestines. Leucocyte count was 7500. The analysis of the stomach showed an absence of hydrochloric acid and pepsin. Severe intestinal hemorrhages continued. Leucocyte count two weeks after operation was 30,000.

The eyes were normal, as was also the sensorium.

There was some subnormal temperature just before the second operation, and elevation of the pulse at the same time. Owing to the poor condition of the man, it was deemed best to look for the suppuration—which was probably located in the cerebellum. Dr. Toeplitz operated upon him again on January 10th, two weeks after the mastoid operation. He worked his way around the sinus and searched the cerebellum and temporo-sphenoidal lobe with exploratory needle. He then found above the sinus an extradural abscess, which was not very large, but the entire bone

was diseased around it. During the operation the pulse became so weak that a saline infusion of 1500 *cc*, with adrenalin, was necessary. After the operation, the temperature was between 102° and 103° the first week, the pulse 116; second week 101°–100°. It was normal two weeks after the operation. January 27th, the hemorrhage ceased. It was ascertained that the man had syphilis two weeks before he was operated. The urine showed suppuration from the kidneys just before or immediately after the first operation. There were pus cells and hyaline cylinders and albumin. This suppuration from the kidneys has continued until to-day. The patient made an otherwise favorable progress up to February 20th, when the temperature began to rise to 100° and the pulse from 100–112. The temperature remained at about 100° for a week. At the end of the week, on February 27th, at 1 P.M., the patient was seized with an attack of convulsions, which lasted five minutes, and were most pronounced on the left side of the face and extremities, the side on which he had been operated upon. Forty-eight hours afterwards, he had another attack of convulsions, with unconsciousness, lasting five minutes, and also mostly confined to the left side. On February 29th, he felt well, but albumin and pus cells were still present in the urine. He was discharged three weeks afterwards, and has had no attack since. The wound is now entirely closed, with the exception of a small opening, which will be closed very soon. He has gained thirty-five pounds since he left the hospital.

Dr. LEDERMAN presented a case that he had exhibited at a former meeting, a colored woman, who, three years since, had been shot at close range right above the tragus with a 32-calibre revolver, the bullet remaining in the ear until a few days ago, when it was removed by Dr. Lederman with the radical operation. The specimen was exhibited. The bullet had struck the petrous portion of the temporal bone and was deflected downwards. When the patient presented herself for examination, it was impossible to detect anything on account of the large fibrous mass in the canal. This mass was removed, revealing a black substance, which proved to be the lead bullet imbedded in the internal wall of the middle ear. The obstruction could not be budged through the canal, so the patient was advised to remain in the Manhattan Eye and Ear Hospital to have it removed. While she was under the anæsthesia Dr. Lederman again endeavored

to loosen the bullet through the canal, but failing to accomplish this, did the Schwartze-Stacke operation. A blackish discoloration was found on the outer wall of the mastoid; this was a little lead, and had to be chiselled away. The patient still had some remnants of facial paralysis, which had existed for three years. She claims that at the time of the accident she was unconscious for one month. She was troubled with vertigo for some time afterwards. The lead extracted from the ear weighed seventy grains. The patient had made a very favorable recovery; the outer wound is practically healed, the vertigo is much better, and her general condition and hearing are much improved.

Dr. CHAMBERS was reminded of a case which he had reported before the Section several years ago: a man attempted to commit suicide. The bullet went along the canal wall and embedded itself in the internal ear. The Schwartze-Stacke operation was done. An effort was made to remove the bullet, but it was found to be too deeply implanted in the bone. It was decided to leave it. The man did very nicely, but without hearing.

Dr. BERENS presented a case of a **radical operation for epithelioma of the middle ear.** The patient, twenty-nine years of age, had suffered from suppuration from the right ear since early infancy. He came to the hospital on February 16th with the history of having had a mass of granulations removed from the external auditory canal by a house surgeon in one of the hospitals in the suburbs. There was extreme tenderness over the mastoid. The radical operation was performed by Dr. Berens, who found the whole of the posterior bony wall gone, as well as most of the anterior wall, and practically all of the inner bony wall. The membranous canal was affected within the bony canal. It had necrosed. The antrum, attic, and middle ear were filled with the granulating mass. This extended down into the mastoid cells, through the antrum. The cortex was eburnated. The disease had attacked the bone around the canal. There was a fistulous tract leading through the anterior wall through which a probe entered the supratonsillar space. The microscopical report by Dr. Jonathan Wright is "probable epithelioma." This diagnosis seems to be substantiated by the fact that there is now a probable return of the trouble in the middle ear. It is to be allowed to grow before being submitted to another examination.

Dr. DENCH spoke of a case of **fibrosarcoma of the middle**

ear upon which he had operated. In this case complete recovery took place, and the patient remained well for at least two and a half years after the operation; since this time he has not reported at the clinic. The recovery in this case was somewhat remarkable, inasmuch as the dura was found to be involved at the time the growth was operated upon. The ordinary radical operation was done for the removal of the growth.

Dr. DENCH also spoke of another case of **sarcoma of the middle ear,** reported about a year ago; the patient was an infant of about eighteen months; at the time of the first examination, a mass of firm granulation tissue filled the middle ear and external auditory meatus. There was also some post-aural œdema. The typical mastoid operation was performed, and a mass of granulation tissue was found protruding through the mastoid cortex. All this granulation tissue was removed by means of the curette, and the destruction of the mastoid was found to be very extensive. An examination of the tissue removed showed that the growth was a sarcoma. The ear was temporarily relieved by the operation, but the growth soon recurred in the wound. Later the growth was treated by means of the X-ray apparatus, and this seemed partially successful, inasmuch as cicatrization of the wound took place rapidly; in spite of this fact, however, the growth still continued to increase in size, and later the common carotid was ligated in the hope of controlling the rapid advance of the malignant disease, by shutting off the blood supply from the part. This procedure did not seem to inhibit the growth in the slightest degree. One of the symptoms which led the author to suspect a malignant growth in this region, when the patient first came under observation, was the fact that there was paralysis of the external rectus upon the side corresponding to the growth. As such a condition is extremely rare after an acute inflammatory process within the mastoid, malignant disease was suspected from the very first time the patient was seen. During the last few months that the patient lived, the growth spread rapidly, involving the Eustachian tube, the lateral wall of the pharynx, and the tonsil. The patient finally died and no autopsy was obtainable.

Dr. WHITING cited two cases of the character of those referred to by Dr. Berens—cases of epithelioma which had their origin in chronic suppuration of the middle ear. Both patients died, one in about a year and the other in six months. The case which

died after the briefer interval presented some interesting features which Dr. Whiting had reported upon another occasion. For the growth subsequent to the mastoid operation he did an operation similar to the one described by Dr. Dench. The growth subsequent to the mastoid operation was extremely rapid—the mastoid wound was healed in about two weeks. It remained closed for ten days, when it became infiltrated, softened, and broke down. The granulations of this cauliflower mass protruded from the inside of the original scar, and also from the orifice of the meatus, in such a manner that the two masses grew together across the auricle of the ear. The cauliflower granulation was the size of a man's fist. It bled profusely on the slightest touch. The patient expressed the wish that the entire mass should be amputated. She was told that such a proceeding would probably be of little or no advantage, but, as she insisted, Dr. Bolton agreed to perform the operation. He tied the common carotid first, and simply sliced the thing right off even with the head. Such a hemorrhage followed as is seen only from a sigmoid sinus, when the jugular vein is cut open. Artery clamps were put around the edges, and after a momentary control of the hemorrhage he took a large cautery which was at hand and applied it as quickly as possible, thus controlling the bleeding.

The patient was much gratified with the procedure. She felt pretty well for four or five days. She rose from her bed in the hospital (Bellevue) and started to walk across the room—she fell dead to the floor.

Dr. HASKIN spoke of a case of epithelioma which he had reported before the American Society at Washington two or three years ago. The case came into the clinic at the Manhattan Eye and Ear. The woman presented a large granuloma extending from the middle ear, with a very offensive discharge and considerable pain. The Doctor operated with a snare, took off a tumor, and had it examined. It was pronounced simply granuloma. When it reappeared the patient was advised to submit to the radical operation. The whole mastoid region was found filled with a black granular mass, which was removed. The whole of the mastoid was removed and a great portion of the dura later laid bare. The whole bony portion of the canal had been destroyed by this same growth. The pathologist pronounced it an epithelial tumor—probably not malignant. The wound did not progress very satisfactorily after treatment for some time, so

it was re-examined, when it was pronounced epithelioma. Another operation was not done on the patient. Five or six months afterwards she presented very much the same appearance that Dr. Whiting had described. The cauliflower-like mass destroyed the appearance of the auricle. The patient finally died.

Dr. TOEPLITZ cited a case he had seen about five years ago, with a return of the mass of granulations in the external meatus. As soon as they were removed they returned—which one feature made the Doctor suspect a malignant growth. The patient, a man about fifty years of age, was operated upon. On opening the cells, it was found that everything was destroyed—the cells and the middle ear; all the bones were broken down, and the whole cavity, as far as the dura mater, filled with these masses. The man died from exhaustion about four months later.

Dr. H. KNAPP spoke of a case he had seen in consultation with Dr. KIPP—a sarcoma in the middle ear. After a second or third relapse it was radically removed, and has not returned in these three years.

Dr. WHITING read a paper entitled, "A Contribution to the Surgical Pathology of Mastoiditis."

Discussion.—Dr. DENCH said he felt like voicing everything said by Dr. Whiting in his paper; he considered it important in all cases of mastoiditis, to do a thorough and complete operation, and he agreed with the author that it was impossible, after opening the mastoid process, to tell exactly when to stop the removal of bone. The only safeguard to the patient was the absolute destruction of the entire pneumatic structure of the mastoid, no matter to what extent it might be necessary to uncover the bone in order to effect this. He did not think that the time required for the healing of these wounds was at all proportionate to the amount of bone removed. In many of the cases which had come under his observation, recovery had been much more rapid where there had been complete removal of the bone, than in other cases where not so much bone had been removed. In order to secure a rapid convalescence, it was necessary to entirely obliterate the pneumatic structure. He also believed that the scar resulting from even an extensive mastoid operation was but slightly noticeable, provided prompt healing of the wound took place.

The speaker believed that Dr. Whiting's paper furnished important points which should be observed by all; that is, in every

case of mastoiditis, it was important to do a complete operation, and to be certain that no cell was left which might contain a focus of pus, and which might later infect the intracranial structures.

Dr. McKernon said that he had little to add—more than a hearty endorsement of the views expressed by Dr. Whiting. It had been his good fortune to begin his operative mastoid work after the dictum of Dr. Gruening, which was, that the tip should be removed in every case, as well as clearing out the mastoid antrum and the cellular spaces. The complete extermination of the zygomatic root had been developed and elaborated very much during the past two or three years—as little or nothing was mentioned about this particular portion of the mastoid up to that time. In the majority of cases he believed it quite as important to explore the large cellular or medullary spaces which are posterior to the sigmoid groove, as it was to uncover and explore those cellular spaces along the zygomatic root; for, many times when there was little or no evidence of pus in the mastoid antrum or at the zygomatic root, it was very frequently found that these spaces were completely infiltrated, and if left untouched a focus remained for further infection in the future. He thought that operators should be guarded as far as leaving a mastoid insufficiently done was concerned, for, if previous to operation there was marked evidence of pain, and this pain was well posterior, the majority of the trouble would be found here and not in the antrum or tip. He had seen many cases where the mastoid structure had been completely uninvolved, and yet, when the bone posterior to the sigmoid groove was uncovered, space after space was found filled with pus and granulation tissue.

Dr. Whiting, in conclusion, said he thought Dr. McKernon's observations bore out in a very flattering manner one of the chief points which he had endeavored to emphasize in his paper: that the antrum being the centre of distribution for these infective practices, extension may take place—*not* by immediate contiguity of tissue, but by remote extension of contiguity of tissue.

MEETING OF MAY 12, 1904. THE PRESIDENT, DR. H. KNAPP, IN THE CHAIR.

PRESENTATION OF CASES.

Dr. Richards exhibited a case of **lateral sinus and jugular thrombosis,** upon which he had operated and in which there

had been a favorable recovery. Prior to the operation, there had been neither remitting temperature nor chill to indicate the condition afterwards discovered. The chief thing which pointed to its existence was beginning papillitis in the opposite eye. Four years ago this same ear was the seat of acute middle-ear suppuration—with apparent complete recovery at the end of ten days. About ten months ago he had a repetition of the same trouble, which continued for three weeks and then apparently ceased. On cessation of the discharge, the patient suffered pain in the mastoid region. There was also some vomiting. On examination, the drum was found to be pale, there was a small perforation, with scarcely enough non-fœtid pus in the canal to cover the end of a cotton applicator. Upon firm pressure on the antrum, tenderness was moderate; over the tip, it was more marked; the suboccipital region was negative. The temperature at this time was a trifle over 99°, the respiration and pulse being in accordance. Operation was advised; it was performed on the following day. The cortex on removal was thin; when it was removed, pale granulations appeared. A radical operation was performed. There was no visible pus present anywhere. The disease had eroded the overlying sinus, the vessel was covered with dirty, blackish, breaking-down granulations. In order to get to healthy bone and dura, it was necessary to remove the overlying sinus groove from the knee to a point as near the jugular bulb as possible. It was necessary to make another incision up toward the parietal region and remove some of that structure. On palpation, the sinus did not occasion any particular uneasiness—it gave no pulsation. The compression experiment was tried, but it was not continued, as the Doctor did not consider the manipulation attending the procedure altogether safe in the presence of a clot. In view of the fact that the temperature was 99°, and at this time there were no symptoms of thrombosis, it was decided to put the patient to bed. Several hours later, the temperature rose to 100⅘°, and remained thereabouts until the following day. On that day, he had a blush upon the cheek, such as is commonly seen in pneumonia. The fundus was examined again in each eye. The left was found to be exactly the same as on the day previous. The right eye had undergone a change, and the papilla had undergone a degree of blurring which was evidently a beginning papillitis. It was then decided to open the sinus. It gave no bleeding; one blade of

the scissors was introduced into the lumen of the vessel and the external vessel wall slit down as near the bulb as possible—and this did not result in bleeding. A jugular resection was then done. The clot was next removed from the sigmoid sinus. The superior petrosal vessel was explored and opened inward to a point opposite the posterior semicircular canal, but bleeding from this source was never obtained, and its lumen was occupied by a clot which apparently was non-infected. A director was then bent and passed out toward the region of the torcular—no bleeding. A scalp incision was made out to that point, and with a gouge a furrow of bone was removed corresponding to the lateral sinus. The Jansen forceps sufficed to make a narrow canal, exposing the external wall of the vessel. This was normal in appearance. At a point midway between the knee and the torcular the clot had broken down, and yellowish-red pus exuded from the thrombus. Slight bleeding was obtained from the torcular end. It was determined to conclude the operation, but before doing so the curette was introduced into the lumen of the remaining portion of the lateral sinus, the precaution being taken to have the assistant exert pressure in the neck over the course of the opposite internal jugular, primarily, for the purpose of cutting off the aspirating influence, and, secondly, for aiding a return flow—a procedure which he had never seen practised. Optic neuritis developed on the fourth day in the left eye. The broken-down contents of the lateral sinus showed staphylococcus infection. The clot representing the extreme distal end of the thrombus was lost; the clot occupying the jugular vein was microscopically negative. The jugular vein itself was invaded beyond the limit of clot by staphylococci. The case was skin-grafted. The patient now hears a low whisper at ten feet.

Discussion.—Dr. GRUENING cited a case of jugular thrombosis in a child—a case in which the thrombus was removed from the jugular bulb. The outer bony wall of the lateral sinus was removed as far as could possibly be done without injuring the facial nerve; an incision was made into the sinus but no blood came from below; the clot was removed with a curette.

It was a case of scarlet fever. The child was taken with scarlet fever on March 9th, with a temperature of 103°, which went up and down, as is usual in scarlet fever, from the 9th until the

14th. At one time the temperature had been 104°; on the ninth day it was 102°; on the tenth day it suddenly rose to 104⅘°. There was some distress in the ear.

On examination of the ear, Dr. Gruening found bulging on one side and redness on the other. Paracentesis was performed on both sides. The pus removed contained staphylococci. On the following day the temperature was still 104°. Because of bulging, another paracentesis was performed. The temperature then dropped to 100°; it rose again the next day to 104°. After this, the temperature remained normal for five days. On the fifth day there was some slight swelling of the glands over both mastoids. There was very little discharge from the left ear; there was decided tenderness over both mastoids. Double mastoiditis was diagnosticated. A number of physicians were called in to corroborate this diagnosis. They agreed upon it and advised operation. At the operation very extensive destruction was found. There was a sequestrum on both sides. When this was removed, the sinus was bare. After the operation, the child had a normal temperature and felt comparatively well. Both sinuses, however, began to be covered with granulations, and on April 1st, ten days after the operation on the mastoid, the temperature suddenly rose to 105° and a fraction. The temperature remained at 105°; it did not go down. It did not exhibit the oscillation that one generally sees in cases of thrombosis. On April 2d, a blood culture was taken. It was negative. A consultation was held, both sinuses were inspected, and one was found to be completely covered with granulations. On the left sinus, where there had been no discharge or bulging of the drum, there was a spot of discoloration. It was concluded that the sinus wall on that side was diseased. Dr. McKernon assisted in the operation in the evening of the same day. The bulb was exposed, the incision made, and there was bleeding from above and not from below. The next day the temperature was somewhat lower, and from that on the patient made an uneventful recovery.

The difficulty in this case was to decide which side was affected. It was not necessary to ligate the jugular. He contended that it was good practice to draw out the thrombus from the jugular bulb.

Dr. PHILLIPS spoke of an experience he had been going through with a scarlet-fever patient. It was a case where there

was no great amount of pus in the mastoid cells, but many centres of infection throughout, all of which seemed about to break down. The patient was a boy about fifteen years of age. After a complete operation, the temperature continued to run at about 102–103° in the afternoon, down to 100° in the morning. The physician in charge was one of our best diagnosticians, and he felt that there was no doubt that this temperature was coming from the mastoid region. Dr. Phillips could not satisfy himself that it did not, but there was no indication of further infection of any kind in connection with the wound. The dressings came out clean. There was a blood count taken every day, and three days after the operation the patient showed some 32,000 leucocytes. This alone, in the opinion of the family physician, settled the question that the temperature was due to mastoid infection. Dr. Phillips gave considerable attention to the case, and finally found in a recent work a record that in scarlet fever it was customary to have an excessive leucocytosis; but no case was recorded where the count was above 30,000. This patient gradually developed a kidney complication, which has remained during the past five weeks, but he has made an uninterrupted recovery from the mastoid wound.

Dr. BACON said that he had been fortunate enough to see the interesting case which Dr. Gruening had reported. He had not learned the outcome and was very glad to hear that it was so favorable. 1. What seemed to him of special interest in this case was the continuous high temperature. It certainly looked like pneumonia. There are often such cases in children where one is much in doubt whether to operate. In the case specified that seemed to be quite a puzzling feature. As no central pneumonia could be diagnosed certainly, it seemed to be a case of sinus thrombosis—as it proved to be. 2. The condition and appearance of the sinus wall. The sinus which contained the thrombus had a grayish and unhealthy appearance and was not covered with granulations, while the other one, on the other side, was completely covered with granulations.

Dr. RICHARDS did not believe it an advisable procedure to curette the bulb of a sigmoid sinus. He felt confident that the percentage of mortality would not justify the procedure; that is, where the sinus is thrombosed and no spontaneous return flow occurs after the external vessel wall has been freely slit open, then a jugular resection should be done. He had not seen a

sufficiently favorable outcome from cases treated in this way to warrant its practice.

Dr. BACON stated that he had had many cases of sinus thrombosis where he had curetted out the bulb, and in which recovery resulted. He did not feel that there was any danger at all in this procedure, and he could not agree with the author of the paper as to his conclusions.

Dr. GRUENING cited an extraordinary case of double thrombosis that he had seen this past winter. The case is living. On one side the clot was removed from the bulb. The temperature remained high, so he was obliged to go to the other side, where he did not get a return flow. He was compelled to tie the jugular and exsect it. The patient did not do well after that. On examining the wound it was found that the jugular had become blocked below. The wound was then extended and the jugular tied behind the sterno-clavicular articulation, and from that time there was a subsidence of temperature, with subsequent recovery. There has been no increased temperature for the past two weeks.

This was the first case of double thrombosis of the lateral sinus that Dr. Gruening had had under his care.

EXHIBITION OF NEW INSTRUMENTS.

Dr. PHILLIPS showed a little **case of ear instruments** gotten up by his assistant, Dr. Neres. On releasing a small catch, a spring is released which raises the instruments at one end. The reverse end of each instrument rests in a small socket from which it can easily be withdrawn.

Dr. GRUENING exhibited a **section of a jugular vein,** which contained streptococci, and called attention to the importance of cutting out the vessel and leaving the wound open. Streptococci were seen in all the walls of the vein. The case was one in the hospital. The patient was operated on and did well for a number of days. He then complained of distress, and it was found that he had a thrombosis on one side. The jugular was exposed and found empty. It was tied behind the sterno-clavicular articulation.

Dr. Gruening spoke of a case which he had recently seen in Mount Sinai Hospital. The patient had been operated on in some other institution for sinus thrombosis. The jugular had

been tied and the wound was closed immediately. A large abscess developed in the neck.

Dr. BACON read a paper entitled, "Report of a Fatal Case of Brain Abscess of Otitic Origin," which is printed in full on page 269, and exhibited the brain.

REPORT ON THE PROGRESS IN OTOLOGY DURING THE THIRD QUARTER OF THE YEAR 1903.

By Dr. ARTHUR HARTMANN.

Translated by Dr. Arnold Knapp.

ANATOMY.

241. **Shambaugh.** The distribution of blood vessels in the ear labyrinth of the ear of Sus scrofa domesticus. Nineteen pages with colored plates. *Decennial Publications of the University of Chicago*, vol. x., Chicago, 1903.

242. **Held.** Investigations on the microscopic structure of the labyrinth of the vertebrates. Part I. on Corti's organ and the other sensory apparatus of the labyrinth in the vertebrates. Leipzig, B. G. Teubner, 1902.

243. **Streit.** On the improper anomalies of the cranial sinuses, on accessory sinuses and important venous communications. *Arch. f. Ohrenheilk.*, vol. lviii., pp. 85 and 163.

244. **Frey.** Report on an unusual abnormality of the anvil. *Arch. f. Ohrenheilk.*, vol. lviii., p. 226.

245. **Streit.** On the oblique course of the facial nerve. *Arch. f. Ohrenheilk.*, vol. lviii., p. 233.

246. **Vernieuwe.** On the surgical anatomy of the mastoid process. *La presse oto-laryngologique*, vol. 1903, No. 8.

241. This excellent monograph furnishes a desirable addition to the comparative anatomy of the labyrinth, and especially of the labyrinth vessels. The author has injected about five hundred embryos and fœtuses and new-born pigs, and of these there were about one hundred serviceable specimens. A watery solution of Berlin glue was used, which was injected through the umbilical artery in the fœtus and embryo under constant pressure and in the carotid of the new-born. In the new-born the most favorable height of the fluid column was 80 to 100*cm*, in smaller

embryos about twice the length of the cadaver. The corrosion of the celloidin corrosions took place in nitric acid for twenty-four hours. The adherent fragments were then removed with the forceps. The examinations were made with the aid of the stereoscopic microscope. Notwithstanding, it was impossible to reach a final decision in regard to the intricate vascular network of the maculæ, and no illustrations or descriptions were possible. The author was able to obtain a perfectly clear picture of the course of the arteries. Agreeing with the descriptions of the reviewer, the labyrinth artery was found not to divide into a number of branches before its entrance into the bone: it first divided into two main branches, namely, into the anterior labyrinth artery, and into a branch which divided into two branches which freely communicated with each other and with the anterior labyrinth artery. One of these branches supplied principally the lower half of the cochlea as well as the posterior part of the vestibulum; the other rises immediately, and supplies the middle and apical turn. As regards the distribution of the main trunks of the veins, the author found them in the pig not to agree entirely with the conditions found by the reviewer in man. The veins of the aqueductus vestibuli and of the porus acusticus were absent. The large veins were also missing in his specimens, which pass in the human labyrinth over the convexity of the bony wall of the ampulla. Further investigations are required at this point to show whether this difference is not caused by a different method of preparation. The large vestibular and aqueduct veins are situated principally not in the endost, firmly united by the celloidin mass, but, as has been shown by the metal corrosion specimens, in special bony channels, whose contents float freely; and if the bone has been macerated for only twenty-four hours, probably are lost in the subsequent mechanical attempts at isolation. The vascular supply of the semicircular canals in the author's specimens present an unusually well-marked capillary network, which is situated in the wall or endolymphatic channel; while in man, the vessels of the semicircular canals are situated in the endost and in Ruedinger's ligaments, and do not form a marked capillary network in the membranous canals. Arterial glomeruli of the cochlea were found absent in the pig, as well as in man.

SIEBENMANN.

242. The histology of the membranous labyrinth has in the

last decades been investigated by the most competent workers. It suffices to call attention to the great work of Retzius, and it is clear that for the investigator of to-day a very small and unpromising field remains uncultivated. Notwithstanding, this paper of HELD'S is a very deserving and noticeable production. The critical analysis of the microscopic conditions resulting from the use of a mixture of bichromate of potash, formalin, and acetic acid, as well as the recognition of the pertinent literature, makes this monograph of Held's unusually valuable in a scientific sense. The investigation followed the wonderful construction of the supporting apparatus of Corti's organ, whose external delicate hair cells are thereby fixed and isolated. The supporting apparatus consists of cells whose protoplasm is characterized by a peculiar fibrous framework, and whose external form is exactly fitted to serve as a support. The Corti's columns and the Deiter's cells belong to the fibrous supporting cells. The internal phalangeal cells and terminal cells are grouped with the supporting cells. The author distinguishes three kinds of supporting cellular systems: (1) the general arch, with three subdivisions; (2) the basal floors of this arch; (3) basal special supports for the hair cells. (1) As regards the general arch, the internal-columnal cell with its head-plate forms the inner boundary. Externally, there is the fibrous system of the third Deiter cell, and in its middle part, by the lamina reticularis, the lower column of the general arch is fastened to the membrana basilaris. The general arch is, however, (2) supported and made tense by the basilar membrane. In the heads of the internal hair cells, complicated supporting fibres are not present. (3) The basilar steps of the hair cells are of importance. This very interesting, supported arrangement and cellular formation has been carefully described by the reviewer in the year 1888, in a paper on the connection of the Corti's and Deiter's cells of Corti's organ and its form. The reviewer at that time showed that the lower part of the external Corti's cell rested upon a peculiar branching cup-shaped structure, which is to be regarded as a protoplasmic excretion of Deiter's cell. Held has been able to confirm this view with his very exact microscopic investigations. As regards the connection of the internal hair cells with the last terminal fibres of the nerves, Held is of the opinion that only in the lowest segment of the hair cell a similar connection exists. The nerves pass as delicate, naked

neurites between the internal phalangeal cells and terminal cells upwards to their destination.

As regards the long-debated question of the termination of the external radiating fibres of the auditory nerves, Held has accepted the view of the reviewer, that the radiating nerve fibres pass through the open part of the branching cup-shaped structures and present at their extremity a peculiarly shaped structure, which in teased specimens represents a granular mass at the lower end of the hair cell.

Held mentions the so-called centrosomes in the cells of the cochlear duct. He finds that the hair cells of the macula and of the crista acustica are completely covered on their surfaces by a neurite protoplasm rich in neurosomes. The reviewer has a number of similar specimens which were preserved in a mixture of osmic acid. These are in general the important results which the author brings in his very careful paper. The illustrations are beautiful and most instructive. KATZ.

243. Partly from literature, partly from extensive investigation of skulls, the normal relations and the various anomalies of the venous sinuses are described. Their relation to the temporal bone deserves otological interest. Attention is drawn to the great importance which these anomalies possess for the pathology of otitic diseases. HAENEL.

244. On the internal surface of the head of the incus, an exostosis was found, situated like a mushroom, consisting of round, compact bone almost 1*mm* in diameter. The temporal bone presented no other pathological peculiarity.

HAENEL.

245. The descending branch of the facial nerve ran in this case 0.7*cm* externally from the annulus tympanicus, about $\frac{1}{2}$*cm* posterior of the frontal plane drawn through the posterior periphery of the sulcus. In this specimen, the horizontal position of the membrana tympani was well marked.

HAENEL.

246. The importance which the structure of the mastoid process possesses in determining the course and the existence of suppurations in the cranial cavity is demonstrated by a number of anatomical specimens and clinical observations.

BRUEHL.

PHYSIOLOGY.

247. **Hensen.** Progress in certain parts of the physiology of hearing. From *Ergebnisse der Physiologie.* Wiesbaden, Bergmann, 1902, p. 49.

248. **Marikovszky.** On the connection between the muscular system and the labyrinth. *Pflueger's Arch.*, vol. xcviii, p. 284.

247. In the large physiological collective report of Asher and Spiro, the chapter on the "Physiology of the Ear" has been written by HENSEN, who can be regarded as the Nestor, as well as the most energetic worker, in this field. It is interesting to see that in the compilation of the material published within the last thirty years the author's own views and conclusions have been confirmed. One hundred and seven papers have been selected. These have been divided into two main chapters on the sound-conducting apparatus and on auditory perception. In the first part, the papers on the external ear are reviewed, and attention is drawn to the importance of its two-time foundation. An experiment of the author is given. The ear canal was closed with warm sealing-wax. The entire auricle was surrounded with a mass of moist clay several *cm* in thickness. The perception of ordinary voice was so little interfered with that questions did not have to be repeated. It was, however, striking that the sound of a medium-sized tuning-fork was always heard louder when the tuning-fork was held directly in front of the auditory canal. Hensen does not accept the view of Mach—that on closure of the auditory canal a tone which is conducted to the ear by bone-conduction is augmented because the escape of sound is prevented. In this, he accepts a paper of Lucae. In regard to the membrana tympani, Hensen opposes Fick's view—that the drum is a resonator consisting of radiating fibres of varying pitch. The unsymmetrical deviation and funnel shape only prevent distributing after-vibrations.

Kessel's and Lucae's experiments on the movement of the drum membrane are cited against the idea of a tuning down of parts of the membrane. The author thinks that unsymmetrical vibrations of the drum membrane and of the hammer and anvil joints can produce combination sounds, notwithstanding the calculations of Hermann.

In the review on the ossicles, the results of Bezold and Schmiedekam, with their own experiments, are given. However, it is added that the observations do not suffice for aural hearing,

because the experiments have been practised with too loud means.

From clinical papers, Hensen concludes that the conducting apparatus produces the hearing for small differences, and that the experiments of Lucae show that the accessory spaces of the ear serve to diminish the resonance within the tympanum.

The question whether the Eustachian tube is open or closed is, according to Hensen, still far from settled. The papers of Lucae, Hammerschlag, Ostmann, and Beckmann only are quoted.

Of the papers on the function of the inner muscles, Bockendahl is first discussed. Attention is drawn to a contradiction with his own experimental results—that in prolonged tones the contraction of the tensor must also be prolonged. This, however, is not always the case, nor is it the logical result of a theory. After a review of Pollak's experiments, Hammerschlag's investigations on the course of the tensor reflexes are carefully described. Hensen thinks that the internal muscles act, in that they serve a purpose in careful hearing when a sound is being watched for, and that thereby the drum membrane, through tension, becomes tuned down, and, notwithstanding the relaxation of the muscle, the vibration is kept up for some time longer than would correspond to the tuning down. The view of Mueller and of Ostmann, that the muscles serve as dampers and protecting arrangements, is not accepted, because dangerous noises, like explosions, are transferred without warning, and that, in general, a membrane put on the stretch would be in more danger of being harmed than a loose one. In the subject of bone-conduction, Hensen recognizes an unusually difficult subject. The physiologically possible ways of conducting sound are the windows or the aqueduct of the vestibule, though the attempts to explain the increased bone-conduction in cases of stapes ankylosis are not acceptable. Neither does he accept the path through the bone to the labyrinth capsule, as was suggested by the experiments of Mader, though he has not actually proved everything against it; his opinion rests upon calculations furnished by Deetjen.

The second chapter on auditory perception is introduced with methods for testing the hearing, and beyond the enumeration of the various well-known experiments he remarks, under the heading of Rinne's test, that the handle of the tuning-fork

should in this case only be used as a test object, because the sound of the branches and of the canal cannot be directly compared. The studies on the dying out of tuning-fork vibrations of Quix, Jacobson, Barton, Bezold, Edelmann, and Schmiegelow lead Hensen to conclude that the tuning-fork is serviceable in making a diagnosis, but that it is a mistake to go beyond this practical use.

In explaining the mode of action of the foot-plate of the stapes and the second molecular movements within the labyrinth fluid, Hensen gives his own experiments and those of Deetjen and Klein, which were performed with the aid of Klein's membrane pipe. He emphasizes also that the acoustic movements of the stapes were not localized to the cochlea, as otherwise a separating plate from the vestibule would have been found present. The experiments of Dennert and Kaiser are briefly reviewed.

The papers of Overbeck, Vierordt, and Wien on the loss in intensity of sound in propagation have led to divergent views. The view of Vierordt, that sound diminishes in arithmetical proportion, is regarded as theoretically impossible by Hensen, and depends upon a mistake in the order of experimentation; according to Wien, the sound diminished somewhat more rapidly than the extension in the spherical wave would have demanded. After describing the papers of Schaefer and Quix, Hensen speaks of an unfinished series of observations which investigate the sensitiveness of the ear for varying pitch. A diminution of the sensitiveness with the pitch is surely not present; it is more likely that an increase exists.

On the limits of hearing, the papers of Cuperus, Appun, Zwaardemaker, Schradt, Bezold, and Krebs are briefly reviewed. The curve of Zwaardemaker is considered unusually instructive, and in presbyacousis the rigidity of the sound-conducting apparatus is not the etiological factor, but we must think of the possible injury to the resonators, if they come into play in distinguishing clang-tint.

It is still an open question how many vibrations are necessary to produce a sensation of tone. Auerbach, Martius, Kohlrausch, Mayer, Abraham, and Bruehl have worked on this subject but have not arrived at a final decision.

The papers of Urbantschitsch on the fatigue and extent of diminution of sound are reviewed.

Personal investigations on the hearing of changes in pitch have made Hensen conclude that the large part of the basilar membrane is set in vibrating motion, and that an apparatus must exist which makes it possible to recognize the site of the maximum of vibration. Possibly, it is situated in the very pronounced number of nerves running longitudinally.

The proof that the cochlea suffices to hear noises does not exist, according to Hensen; nothing speaks for the necessity that noises are perceived by the cochlea and not by a noise organ. A number of papers are reviewed in this sense to show that the cochlea can act as a form of resonating apparatus; the clinical results of Bezold, and Urbantschitsch's examination of deaf-mutes, and of Gradenigo and Berthold in diplacusis are given. Experimental investigations in this direction are furnished by Munk, Baginsky, and Ewald. Koenig, ter Kuile, and Lindig have endeavored to show the possibility of presenting phase differences.

The question whether hearing is possible without a labyrinth, and only with a stump of the auditory nerve, is partly positively and partly negatively answered. There are experimental papers, from which we learn that we must be very careful in answering the question of hearing and of not hearing.

Under the investigations on the course and termination of the auditory nerve in the brain, Siebenmann's classification is accepted, and the papers of Baginsky, Monakow, Monk, and Larionow are reviewed.

In a concluding remark, Hensen regrets that his review had to pass over a period of thirty years, and that he had not, therefore, been able to do justice to all papers. "Unquestionably, observations and results of experiments which prove to be important beginnings of progress will surely later come to their right."

ZIMMERMANN.

248. Based on the investigations of Hoegyes, Ewald, and of the reviewer, the author studied the changes which took place in the muscular system of the body after half- and whole-sided destruction of the labyrinth, which was classed as disturbances of the equilibrium. Doves and rabbits were experimented with. This paper is to be greeted with pleasure, as a new contribution to the structure of the theory of a tonus-labyrinth. We find here, for the first time, co-ordination tables for the muscular tone emanating from the labyrinth.

According to the author, the labyrinth in the rabbit is in connection on the one side with the occipital muscles ;

The external rectus, the superior rectus, and the superior oblique of the same side ;

The internal rectus, inferior rectus, and the inferior oblique of the other side ; with the

Muscles which rotate the head laterally, of the opposite side ;

On the anterior extremity, with the abductors, extensors, and pronators of the same side ; and the

Adductors, flexors, supinators of the opposite side ; and with

The trunk muscles of the same side.

The author has not been able to describe a definite scheme for the tonus action on the posterior extremity. He agrees with Hoegyes and the reviewer that the muscles of respiration and phonation are in connection with the labyrinth, though he is not sure whether they are homonymous or crossed. According to the reviewer, an idea of tonus cannot be given in such a definite manner. Unquestionably, both halves of the body receive tonus from each labyrinth in certain muscular groups, principally crossed ; in others, principally uncrossed. This is shown by the fact that we cannot obtain a complete relaxation of a single muscle in one-sided destruction of the labyrinth. Complete relaxation, moreover, appears only after complete destruction of both labyrinths.

The author is, in a certain way, also of this opinion, for he assumes that in the dove the labyrinth is connected with the reflex inhibitory arrangements of the opposite- and the muscles of the same-sided, extremity.

Differing from my own result is the observation that, of the trunk muscles, the homonymous trunk muscles receive their tonus from the labyrinth of the same side ; while I have found them principally to receive them from the opposite side. I, however, firmly believe in my own results. DREYFUSS.

GENERAL.

a.— REPORTS AND GENERAL COMMUNICATIONS.

249. **Schmiegelow.** Communications from the oto-laryngological division of the St. Joseph's Hospital, 1902. Copenhagen, 1903.

250. **Bauerreiss.** Report of Professor Habermann's clinic for diseases of

the ear, nose, and throat in the University in Graz, from Jan. 1, 1898, to Dec. 31, 1900. *A. f. O.*, vol. lviii., p. 236.

251. **Buerkner.** Report on the service of twenty-five years in the University Ear and Nose Clinic in Goettingen, from Feb. 20, 1878, to March 31, 1903. *A. f. O.*, vol. lix., p. 20.

252. **Voss.** Report on the ear clinic of Professor Trautmann for the year from April 1, 1901, to March 31, 1902. *Charité-Annalen*, xxvii.

253. **Daae, Hans.** Investigations in the cause of diminished hearing in school children. *Norsk Magazin for Laegevidenskab.*, No. 8, 1903.

254. **Boulay.** Ear disease considered from a life-insurance standpoint. *Ann. des mal. de l'or., du lar.*, 1903, 3.

249. Two hundred patients were discharged, 6 died. Of 202 operations, 28 were radical operations on the middle ear, 19 simple mastoid operations after Schwartze, and one radical operation after Stacke. Thirty-three cases of chronic purulent otitis are reviewed. Pyæmic symptoms appeared in 2. The particulars of these cases have been published. After the radical operation, 15 cases were healed, 7 were improved, in 2 the final result was unknown, and in 2 the after-treatment was interrupted. The cause of death in the 2 fatal cases was, serous meningitis in one, and in the other, tuberculous meningitis, which developed during the course of a purulent otitis and was erroneously supposed to have started from the ear. In the 24 cases which were operated upon radically, in 12 the hearing was improved, in 1 the hearing was unchanged, in 2 it was diminished, in 9 no record was kept of the hearing. JOERGEN MUELLER.

250. After a statistical arrangement of the material, a complete report on 12 unusually interesting cases of middle-ear suppuration with complications follows. One case of acute mastoiditis deserves mention, which ran its course with a hemiplegia of the opposite side. At autopsy an abscess was found in the thalamus opticus, presumably metastatic in origin. Of the 10 cases of sinus thrombosis, 2 died from complications present before the operation, 4 recovered after simple exposure of the diseased sinus, 3 after operation on the sinus, 1 succumbed to chronic sepsis following a metastatic colitis after operation. In no case was the jugular vein ligated. HAENEL.

251. This is principally a statistical study. During the twenty-five years, 30,777 patients were treated. Of these, 58.68 % were males, 40.32 % were females; the percentage of children was 46.45 %. Of the diseases, the ear was affected in 84.50 %, the nose and naso-pharynx in 15.29 %. Of the ear diseases, 26.79 %

were located in the external ear, 68.91 % in the middle ear, and 4.30 % in the internal ear. HAENEL.

252. Two hundred and forty patients were treated in the hospital. The antrum was opened in 54; the radical operation was performed in 88. Of the cerebral complications of chronic suppurations which terminated fatally, with the exception of an abscess of the temporal lobe, there were 4 sinus thromboses and 2 abscesses of the temporal lobe. The case-histories and autopsy reports are given. An unusual case of melano-sarcoma of the auditory canal is mentioned; also, one of a tumor in the floor of the fourth ventricle in double-sided chronic purulent otitis, an injury of the labyrinth wall with a knife (in the region of the external semicircular canal and of the facial canal).

BRUEHL.

253. From 1895 to 1901 the number of deaf children in the public schools was found to show that 4 % were deaf; of the children who, on account of their extreme deafness, were not able to pursue their studies, there were 0.50 % and 0.26 %. Of these deaf, 47 were examined. Nearly all the children showed pathological changes, and in 39 % of the boys and 56 % of the girls suppurations or their sequelæ were present. In a separate class, including the feeble-minded and the extremely deaf, there were 11.2 % deaf. Forty-four were examined and only five drum membranes showed a normal appearance. In 40 % of the boys and 50 % of the girls, suppuration or its sequelæ were present. These figures apply only to those who were practically considered to be deaf. On examination with the whispering voice, the number of deaf (and hearing power less than 4*m*) showed 41 % in the primary schools and 90 % in the special classes. In order to remedy matters, an attempt should be made to limit the deafness and also to arrange a better system of instruction. It is important to direct attention to the auricular suppuration in scarlet fever, measles, etc. (The author recommends immediate paracentesis.) The adenoid vegetations should be removed. These were found in 56.5 % of the deaf boys, and in 75 % of the deaf girls. The deaf should be instructed in special classes, but not together with the deaf-mutes; otherwise, they are liable to forget the use of hearing. JOERGEN MUELLER.

254. BOULAY thinks it is very necessary that life-insurance companies should lay more stress upon the careful examination

of the ears. Not only should a definite line of questions be put, but when abnormalities are present a specialist should be consulted. ZIMMERMANN.

b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

255. **Panse.** Clinical and pathological communications. III. Anatomical conditions in patients whose hearing has been tested. *A. f. O.*, vol. lix., p. 84.

256. **Grunert.** On the prognosis of bullet wounds of the ear. *A. f. O.*, vol. lix., p. 129.

257. **Frey.** On the occurrence of glycosuria in otitic disease. *A. f. O.*, vol. lviii., p. 171.

258. **Toubert** and **Fasquelle.** Hearing across a scar in patients who have had the vault of the skull trephined. *Arch. internat. d'otol.*, etc., lxiii., p. 845.

259. **Felix.** On the involvement of the middle ear in lupus vulgaris and leprosy of the upper respiratory passages. *Ann. des mal. de l'oreille, du lar.*, No. 3, 1903.

260. **Bonnier.** On distant paracousis. *Ann. des mal. de l'oreille, du lar.*, No. 2, 1903.

255. The description of the histological findings in thirteen temporal bones is preceded in every case by the functional examination of the hearing made during the patient's life.

In the temporal bones I. to III. there was an atrophy in the basal part of the spinal ganglia; in IV. to V. there were connective-tissue bands in both windows, a diminution in number of the basal ganglion cells; VI. to VII. presented connective-tissue occlusion of both windows, a diminution of the basal ganglia. In VIII. to IX. there was bony ankylosis of the stapes; Corti's membrane had sunk down into the internal spinal sulcus; its fibres were separated; hyaline masses replaced Corti's columns. The basal ganglion was surrounded by connective-tissue bands. The auditory nerve was degenerated. Cases X. to XIII. have been published in PANSE'S previous communications. Panse finds that the most striking feature in his examination is the disproportion between the atrophy of the basal ganglion cells and the good hearing for high and very high tones. HAENEL.

256. While superficial bullet wounds of the ear usually give a better prognosis than the deep wounds, the two cases published by GRUNERT show the opposite condition:

(1) Bullet wound in the depth of the canal, anteriorly down and in. Dysphagia or marked deafness; no vertigo; after thirteen

days the revolver bullet was coughed up. Three months after the injury, the patient came for treatment on account of the suppuration. This was healed, with closure of the drum. A whisper could be heard in 50*cm*, so that presumably only a very light degree of labyrinthine concussion was present.

(2) Superficial wound in the vicinity of the ear, with destruction of the anterior bony canal wall; severe injury to the labyrinth, with permanent deafness and vertigo; middle-ear suppuration, membranous stenosis of the canal. At the radical operation, the incus was found dislocated into the antrum.

HAENEL.

257. In connection with a paper of Grunert's on the same subject, FREY reports on a case of cerebellar abscess which was healed by operation, in which, together with a disturbance in respiration and heart action, with rhythmic pulse, a transient but very marked glycosuria was observed. He regards this glycosuria as being dependent upon inflammatory irritation in the vicinity of the morbid focus, which extended to the centres in the floor of the fourth ventricle. This explanation appears to him to suit Grunert's case of extradural abscess with pachymeningitis, in which Grunert found the glycosuria to depend upon certain toxic conditions. In questionable cases of intracranial disease after ear lesions, Frey considers the answer to glycosuria to point to the localization of the process in the posterior cranial cavity.

HAENEL.

258. J. Larrey ("Injuries to the Skull, and their Operative Treatment," 1834) reported on four patients who were trephined on account of injury to the skull and complained after the operation of tinnitus or autophony and hyperacousis. These symptoms were relegated to the operation, and Larrey believes that persons who have been trephined hear through the trephined opening. This same standpoint is taken by Guyon (1843), as well as by H. Larrey (1867), with a further publication of three cases.

TOUBERT and FASQUELLE have observed a patient who was trephined on account of a bullet injury. After a careful examination, they conclude, with Courtade, that the presence of a bony defect in the vault of the skull does not change the hearing apparatus in its function, and that the tinnitus, as well as the hyperacousis, depends upon the fundamental lesion and not upon the operation.

OPPIKOFER.

259. In the twenty cases of lupus which FELIX examined, generally a bilateral middle-ear catarrh was present; in one case, also an ulceration of the Eustachian tube, with suppuration; in three cases, suppuration independent of lupus. In leprosy, the nervous form was present as long as the naso-pharynx and the nose were not affected; no changes in the middle ear. The tuberous form had, however, affected the middle ear in six cases.

ZIMMERMANN.

260. BONNIER repeats his experiment of placing the tuning-fork at a point distant from the ear, and praises it as a more rational method of performing Weber's test. The physical proof depends upon the extraordinary fiction, that from the handle of its tuning-fork two forms of waves always emanate simultaneously—one a sound-producing and the other a vibrating, and that only the first reaches the ear, while the latter soon disappears. Practically the presence of distant paracousis in a deaf person shows a peripheric disease, while its absence, a nervous disease. If this paracousis is present without other functional disturbance, then the first sign for progressive deafness is present.

ZIMMERMANN.

c.—METHODS OF EXAMINATION AND TREATMENT.

261. **Ostmann.** On quantitative determination of hearing with the objective hearing-scale. *A. f. O.*, vol. lix., p. 137.

262. **Urbantschitsch.** Vibratory massage of the Eustachian tube in chronic middle-ear catarrh. *M. f. O.*, 1903, No. 3.

263. **Urbantschitsch.** An apparatus for friction massage of the ear or Eustachian tube. *M. f. O.*, 1903, No. 4.

264. **Goldstein.** The use and abuse of the Eustachian bougie. *The Laryngoscope*, July, 1903.

265. **Warneke.** The treatment of the ear and nose with hot air. *Berl. klin. Wochenschr.*, 1903, No. 37.

266 **Haug.** Anæsthesin in the treatment of involvements of the canal, and for local anæsthesia in paracentesis. *A. f. O.*, vol. lviii., p. 267.

267. **Haug.** On the influence of certain subjective auricular symptoms by treating the genital zones of the nose. *M. f. O.*, 1903, No. 3.

268. **Hopkins.** The treatment of chronic catarrhal deafness. *Med. News*, Aug. 22, 1903, p. 354.

269. **Urbano Melzi.** Contributions to the treatment of external otitis media, with intratympanic injections of pilocarpin. *Arch. internat. d'otol.*, etc., 1903, p. 635.

270. **Connell.** A suction apparatus for continuous drainage. *Annals of Surgery*, vol. xxxvii., 1903, p. 886.

271. **Chevalier.** On adrenalin. *Les nouveaux remèdes*, 1903, No. 12.

272. **Duel.** The possibilities and limitation of the electrolytic bougie in the treatment of chronic catarrhal otitis. *The Laryngoscope*, July, 1903.

273. **Roosa.** On the use of the Eustachian catheter. *Post-Graduate*, N. Y., July, 1903.

261. OSTMANN describes the method of measuring the hearing with his objective scale. His new tables of amplitudes apply only for the latest Edelmann's tuning-forks. An examiner who is deaf must, naturally, in order to determine the difference-time between the patient's hearing and that of a normal hearing, regard his own deafness. If one places the hearing acuity of the one to be examined and of normal hearing inversely proportionately to the square of the relative degree of amplitudes, and if one reckons normal amplitude as 1, we get for the hearing acuity a definite value, which can be easily determined from Ostmann's tables. The acuity for the various forks C, G, c, g, c^1, etc., can then be arranged in the form of a curve.

HAENEL.

262. After the introduction of a very thin celluloid bougie up to the tubal isthmus, external massage is practised for four minutes with a pad set in motion by a motor. The pad is applied in the vicinity of the ear, and a rapidity of the motor is desirable in which the bougie shows the greatest vibratory movements. The author thinks that this form of massage acts like a tonic on the tubal muscles and on the tensor-tympani, increases the circulation in the tube and in the middle ear, and finally acts reflexly through the branches of the fifth nerve in the tube on the auditory nerve. In a number of cases where other methods had been applied without avail, this procedure gave a favorable result—especially in reducing the subjective noises.

PIFFL.

263. URBANTSCHITSCH has had constructed an apparatus which, with the aid of two electric magnets on a rod, conveys various movements which can be employed in practising massage of the tube and of the mucous membrane of the naso-pharynx.

PIFFL.

264. Our author states that the bougie was a favorite of pioneer otologists, and was first used by Saissy in 1860. Its construction has varied from catgut to the perfected gold electrolytic instrument, such as is used by Duel, Phillips, and others. At the present day, bougies of whalebone or gold are chiefly used.

The bougie is very useful in diagnosis. It should be regularly employed in every case of otitis media chronica.

The author prefers the whalebone bougies, and uses them in five sizes, from $\frac{1}{3}mm$ to $1\frac{2}{3}mm$, and has the bougies marked, in order to show what position the olive tip occupies in relation to the beak of the catheter. The chief precaution to be observed is never to use force.

The Eustachian bougies is of established value in all chronic affections of the middle ear, not only where there is decided obstruction of the tube, but also where the lumen of the tubal canal has a diameter diminished to less than $1\frac{1}{3}mm$. The introduction of the bougie should be repeated every two or three days.

The author has found the bougie of value in occasional cases of chronic suppurative otitis media, with narrowing of the tube. He believes that a mild galvanic current, with its stimulating effect, enhances the value of the bougie, but is not sanguine as to its electrolytic results.

When the electric bougie is used with sufficient current to pass a tight stricture, it produces an erosion which is followed by reaction, and a further narrowing of the tubal lumen may result.

W. S. BRYANT.

265. The treatment with hot air is specially to be recommended for the after-treatment after the radical operation on the middle ear, then for a conservative treatment of chronic suppurations, especially when located in the attic, and also for empyemata of the antrum of Highmore. The apparatus is constructed by Pfau, in Berlin. MUELLER.

266. In furuncles of the auditory canal, anæsthesin after 2–10 minutes produces a diminution of the pain for two hours, without influencing the course of the disease. In acute and chronic eczema, in nervous, diabetic, or arthritic pruritus, the remedy has relieved the itching. The action on the drum is not removed, the consecutive discoloration of the drum membrane and the presence of anæsthesin crystals render this remedy not suited for paracentesis. In acute exudative middle-ear processes that are getting better, a solution of thymol-anæsthesin-glycerine has acted well as an analgesic. HAENEL.

267. HAUG describes four case-histories of female patients, in which the subjective noises and the ear pain without objective changes in the ear were always connected with the menses, and

presented characteristic changes in the genital zone of the nose, as has been described by Fliess. PIFFL.

268. The author recognizes treatment with warm vapors, ozone, and iodine-cataphoresis. Applications of very hot air to the exterior auditory canal—250 to 400 degrees. The temperature used in the Eustachian tube should not be so high. He mentions many other forms of treatment. W. S. BRYANT.

269. On learning of the excellent results accomplished by Fischenich (*Berliner klin. Wochenschrift*, 1900), MELZI injected in three cases of oto-sclerosis a two-per-cent. solution of pilocarpin into the middle ear. In one case, after about eight injections, a decided diminution of hearing set in; in the other two, deafness and tinnitus remained to the same degree after fifty injections. OPPIKOFER.

270. The principle on which the action of the apparatus depends is the power which a falling column of water in a narrow tube has of forcing air ahead of it and sucking air after it.

The author uses a $\frac{3}{16}$-inch tube and constructs a convenient apparatus capable of exerting sufficient suction to drain any cavity, and susceptible of regulating both the amount of the negative pressure and the rapidity of action. The apparatus is a cheap and simplified adaptation of a device by Dr. Francis Markoe. W. S. BRYANT.

271. From experiments on animals, the author agrees with other investigators that adrenalin increases the blood pressure only for a short time; as the peripheric vessels are only transiently constricted, application of adrenalin is useless when a permanent vascular constriction is desired.

272. The electrolysis of the Eustachian tube is but one of the many methods of treating chronic catarrhal otitis, but one pre-eminent for its power to restore patency of the tube. To achieve the best results electrolysis should be used sparingly, and always in connection with other forms of treatment.

The technique of the operation requires careful, patient manipulation, and the accidents which have been reported may be attributed either to the use of too much force and the neglect of caution, or to some cause independent of this method of treatment.

After electrolysis tympanic inflation should be withheld for a day or two, and if a further treatment is necessary an interval

of two weeks should be allowed to elapse before its repetition. Often one application has been sufficient. Repeated bougieing sometimes has been required. Many of the treated tubes have remained open for years; others, for a shorter time.

The precautions to be observed are to avoid using it too often, too hurriedly, or too strong. Small bougies, small current strength, considerable time, and an immense amount of patience are the precepts to follow. BRYANT.

273. Cocaine in the nares is often objectionable. To lessen the pain in passing the Eustachian catheter a rubber catheter is preferred to a silver one. Also the beak should be shorter than those usually found in the shops. BRYANT.

d.—DEAFMUTISM.

274. **Alexander** and **Kreidl.** Statistical examination of deaf-mutes. I. Deafmutism, hereditary influence, and consanguineous marriages. *A. f. O.*, vol. lix., p. 43.

275. **Mayet.** Consanguineous marriages and the statistics. *Jahrb. der int. Vereinigung f. vgl. Rechtwissenschaft*, vols. vi. and viii.

276. **Wishard.** Deafmutism. *Indiana Med. Jour.*, Aug., 1903.

277. **Reinfelder.** Hearing exercises in the deaf. *Blätter für Taubstummen Bildung*, xvi., No. 20.

278. **Heimann.** The blind and the deaf-mutes in Prussia. *Deutsche med. Wochenschr.*, No. 33, 1903.

274. The following investigations were based upon answers obtained from the various deaf-mute institutes of Austria. There were 558 cases, and the conclusions are as follows: The parents were related in 3.76 %; deafmutism, loss of hearing, or insanity of the parents in 2.3 %; deafmutism, deafness, or insanity in the relatives of the parents in 13.3 %; a combination of the various factors in the parents and their relatives in 1.8 %. The relationship of the parents is of no importance as a differential diagnosis between congenital and acquired deafmutism. This also holds good for deafmutism, deafness, or insanity of nearer relations; also a combination of these various factors. Deafmutism, deafness, or insanity of the parents, as well as the simultaneous affection in the father's or the mother's family, speaks for congenital deafness. The presence of a number of deaf-mute brothers and sisters also points to congenital deafmutism, and with greater probability as the number of deaf-mute brothers and sisters increases. HAENEL.

275. In Prussia, during a period of twenty-five years (1875–99), of 5,922,439 marriages, 38,310 were consanguineous. Of 1000 marriages, 6.47 % were between relatives, and of these 5.87 % were brothers and sisters; 0.49 % uncles and nieces; 0.11 % nephews and nieces. With a minimum number of 6.5 % consanguineous marriages in Prussia, it can be taken for granted that 365,950 offspring are living. In the statistics of the insane asylums and institutions for idiots, imbecility and weak-mindedness are considered less of a hereditary factor than the simple mental disturbance occurring in the paralytic and combined with epilepsy. In weak-mindedness, the occurrence of the disease is influenced by the consanguinity, while in three other forms of mental disease consanguinity appears to be an advantage for those consanguineous without hereditary taint. In hereditary taint, the offspring of consanguineous marriages are much more liable to these three forms of mental disease than the children of other marriages. In idiocy, imbecility, in which consanguinity of the parents plays a great rôle, the children of the uncle and niece are more affected than those of cousins. The conditions in deafmutism and retinitis pigmentosa are similar to those in weak-mindedness; heredity plays a slight, consanguinity a great, rôle. Investigations should be undertaken to determine whether there is not an advantage in consanguinity of parents for the mental development. This would certainly be a result which would be gratefully received by many consanguineously married persons. BRUEHL.

276. The investigations were carried on in the Indiana Institution for the Education of the Deaf. 317 pupils examined: 183 male; 134 female; average age a little above twelve years. Of these, 119 born deaf, 37 %; brain fever, 36; cerebro-spinal meningitis, 34; catarrhal, 20; otitis media, 16; scarlet fever, 15; bronchitis, 15; influenza, 9; measles, 8; typhoid, 7; malarial fever, 6; scrofula, 4; whooping-cough, 3; mumps, 3; diphtheria, 2; fever, 2; quinine, 2; earache, 1; inanition, 1; paralysis, 1; spasm, 1; tonsillitis, 1; eczema, 1; unknown, 9.

The institution from 1844 to 1900 — fifty-six years — admitted 2227 deaf-mutes; 754 of the number were congenital, about 34 %.

Age at which deafness was recognized: congenital, *i. e.*, 754 under one year; 215 between one and two years; 289 between two and three years; 107 between three and four years; 128

between four and five years; 97 between five and ten years; 227 between ten and nineteen years; 58 unknown.

He states that of 317 children examined 32 had hypertrophied tonsils; 33 had foul catarrh; 20 % of the acquired deafness came from the nose, and that it might have been prevented.

He states that the deaf and blind have their sense of smell highly developed, by necessity. W. S. BRYANT.

277. This is a report of the teacher on the instruction of seven deaf patients through the ear. They had been selected by Hartmann. They knew no words, and did not care to speak. In addition to the diminution of the hearing there was a mental lack of development. Hearing examinations before the exercises one year later with the voice are compared in tables. Before the exercises, all the scholars heard vowels—no consonants and no words. In the exercises through the ear alone there was no improvement; with the aid of the eyes, the scholars were able to acquire simple syllable speech, and were mentally much improved; with the aid of the conversation tube, instruction through the ear in some of the deaf was more successful than when combined with the eyes, and the hearing of these deaf improved so that they were able to understand loud speech at a distance of six metres. All children who are able to perceive vowels and consonants through the hearing tube belong in a special institute for deaf; others who do not perceive through the hearing tube are to be instructed in deaf-mute institutes. The speech of some children instructed with the hearing tube is equal to that of those with normal hearing. BRUEHL.

278. In this paper, the fact is of interest, that while the number of blind has not decreased since the year 1871, that of the deaf-mutes is very much increased, though the increase corresponds approximately to the increase in the population.

NOLTENIUS.

EXTERNAL EAR.

279. **Ostmann.** Deformities of the external ear among the public-school children. *A. f. O.*, vol. lviii., p. 168.

280. **Sugar.** Rudimentary misshapen auricle, with atresia of the canal, congenital auricular fistula and facial hemiatrophy, probably from congenital hypoplasia of the paralyzed nerve. *A. f. O.*, vol. lviii., p. 216.

281. **Juergens.** Three cases of congenital atresia of the external auditory canal. *La presse oto-laryngologique Belge*, 1903, No. 7.

282. **Alexander.** On the pathological anatomy of keloid of the auricle. *A. f. O.*, vol. lviii., p. 195.

283. **Fleischel.** Arterial angioma of the ear. *Wiener med. Wochenschr.*, No. 35, 1903.

284. **Braislin.** Teratoma of the ear. *Brooklyn Medical Journal*, July, 1903.

285. **Konictzko.** A case of chondroma in the bony part of the external auditory canal. *A. f. O.*, vol. lix., p. 7.

279. In 7537 school children there were 54 deformities of the external ear, viz.: auricular appendages, 12; Wildermuth's ear, 27; Darwin's pointed ear, 9; "Satyrohr," 1; cat's ear, 5; in 32 the deformities were bilateral. This was especially noted in cases of Wildermuth's and Darwin's ears. Certain districts seemed to be particularly affected. Frequently, the relatives of the children presented malformations of the external ear.

HAENEL.

280. The case is interesting on account of the combination of the various deformities. The hearing spoke for an abnormal labyrinth. The author warns against operations with the purpose of restoring the canal and improving the hearing, as in the various autopsies which have been made very deep-seated changes had been found both in the external and in the middle ear. For cosmetic purposes he recommends a wax model of the auricle as made by Henning in Vienna. HAENEL.

281. JUERGENS reports on three cases of microtia with closure of the external canal, in which an exact examination of hearing had been made. In the first, there was complete deafness for all forks, both by air and by bone. In the second, Weber was lateralized to the normal ear; loud voice was heard by the misshapen ear with difficulty when the normal ear was carefully closed; the lower tone limit was h, the upper f^5. The third was a child three months old, where the tuning-forks were distinctly perceived by bone-conduction, although the deformity was bilateral. BRANDT.

282. ALEXANDER has examined two keloids of the auricle microscopically, and agrees with the views of Thorn that the keloid arises from sudden hypertrophy and hyperplasia of the normal corium. There is no proof for the correctness of Warren's theory which regards the process as a proliferation of the media and adventitia of the blood-vessels. Alexander does not

regard the carrying of ear-rings to be the cause, as much as the formation of the puncture canal for the ear-ring and the consecutive inflammatory reactions in the neighborhood, added to an individual predisposition. HAENEL.

283. After a survey of the literature, according to which thirty per cent. of these angiomata are found about the ear, the author relates the case-history of a patient thirty-six years of age:

Since birth, a blood-tumor, of telangiectatic origin, as large as the head of a pin, existed on the right auricle near the helix, which had within the last two years distinctly enlarged; occasional hemorrhages for five years. The auricle was increased to three times its normal size, was red, and pulsated. On compression, the auricle shrank to one-half its former size, and a distinct bruit could be heard. The enlargement involved the helix and the antihelix. The lobule of the ear was free; the length was 10*cm*, breadth 6*cm*, thickness 3*cm*.

FLEISCHEL ligated the posterior auricular artery close to its origin from the carotid; also the anterior auricular artery and a number of smaller vessels, after cutting around the auricle. The auricle was cauterized in fifteen places with the Paquelin; this latter step is to be practised after the ligation of the blood-vessels. Complete healing, with good cosmetic effect.

WANNER.

284. Patient, a woman of fifty, complaining of very severe tinnitus, keeping her awake. Ear history two years. No pain, but itching. Latterly almost absolute deafness. Meatus occluded; watch not heard on contact. Examination showed external canal tightly blocked by a tumor. Small probe could not be passed. Tumor appeared to be attached from above. It was covered with skin, and looked like a sebaceous cyst, a dilated vein crossing its outer extremity. It was too dense to be a cyst. Exploratory puncture caused brisk bleeding, indicating diagnosis of angioma. Operation.

Incision behind auricle; ear drawn forward; tumor found attached by pedicle to periosteum of bony canal, which it tightly filled. The tumor was encapsulated. Restoration of hearing followed its removal. It was composed of cartilage and myxomatous tissue, with abortive glandular elements.

The diagnosis of endothelioma was made by some from the microscopic specimens as well as the diagnosis of teratoma.

W. S. BRYANT.

285. The cylindrical tumor, about 4*mm* long, 1½*mm* thick, was situated on the anterior bony wall of the canal, in a boy fourteen years of age. The origin, according to the author, can be referred to a metaplasia of the periosteum, which had been an obstinate inflammatory process in the tympanum.

HAENEL.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

286. **Schmiegelow.** On the diagnosis and treatment of acute middle-ear suppuration. *Ugeskrift for Laeger*, Nos. 33 and 34, 1903.

287. **Godokesen.** Some remarks on Professor Schmiegelow's paper: The diagnosis and treatment of acute middle-ear suppuration. *Ugeskrift for Laeger*, No. 36, 1903.

288. **Haag.** On the operative treatment of acute purulent otitis media. *Korrespondenzblatt für Schweizer Ärzte*, 1903, No. 18.

289. **Botschkowski.** A case of favorable influence exerted by erysipelas on the course of a purulent otitis. *Wratschebnaja Gaseta*, No. 38, 1903.

290. **Biehl.** Sharply circumscribed inflammatory foci in the temporal bone. *Münchener med. Wochenschr.*, 1903, No. 34.

286. The diagnosis of acute purulent otitis media is first discussed on the basis of 110 cases. Of these, 61 were cured without complications; in 31, complications set in (the cases, however, healed); in 2, with diabetes, the termination was fatal; in 5, a dry perforation persisted; in 6 cases the suppuration became chronic, and in 5 the subsequent course was unknown.

SCHMIEGELOW recommends that paracentesis be done as soon as the diagnosis of purulent otitis is confirmed. He cites 71 cases where paracentesis was performed, and gives the average length of the disease:

11 days, when performed between the first and third days (13 cases)
15 " " " " " third and sixth days (31 cases)
21 " " " " " seventh and tenth days (16 cases)
2 months, when " after " tenth day (11 cases)

A paracentesis performed at the right moment is the best guard against complications. After paracentesis, a wick of iodoform gauze, moistened in a 2 % carbolic solution, is inserted; a dressing with sterile gauze and a bandage is applied. This is changed every day. Irrigations and cleansing manœuvres are not permitted.

MOELLER.

287. GODOKESEN believes that paracentesis should not be done too early, and that if there are no beginning complications the treatment may be expectant. He recommends absolute rest in bed. The bandage does not act well if there is a great deal of discharge; it acts like a poultice, and easily leads to maceration. The best treatment is closure of the canal with a plug of sterile cotton which is frequently changed. At the beginning, the instillations of cocaine, and the ice-bag, are of service.

MOELLER.

288. Associated involvement of the mastoid cells in acute otitis media usually heals with conservative treatment; when an operation has to take place, an empyema is present, though empyemas may heal without operation, as in seven of the eight cases reported by the author. In the treatment of acute mastoiditis, paracentesis of the non-perforated portion is most important—though this operation should only be performed in the extreme cases. In the operation for empyema of the mastoid the antrum is only exposed when necessary; in most cases it is not necessary, and should not be done with a view to future hearing,

BRUEHL.

289. A patient with acute otitis media presented inflammatory symptoms in the mastoid process, which disappeared with the onset of an attack of erysipelas. As the beginning mastoiditis frequently gets well without operation; the reasoning that the erysipelas exerted a favorable influence is not correct.

SACHER.

290. Four cases of the not unusual form of acute middle-ear diesase, with involvement of the mastoid process, in which the tympanum is but little affected. The bacteria found present were the diplococcus pneumoniæ and the staphylococcus. The author's suggestion to fill the bony cavity with Mosetig's bone filling and suture primarily, will probably not have many imitators.

SCHEIBE.

b.—CHRONIC PURULENT OTITIS.

291. **Panse.** Clinical and pathological communications. II. Bone disease of the labyrinth, with six illustrations, after drawings by the author. *A. f. O.*, vol. lviii., p. 184.

292. **Imhofer.** A case of spontaneous dislocation of the incus, with a fistulous perforation into the bony auditory canal. *Prager med. Wochenschr.*, 1903, No. 36.

293. **Boeke.** Opening of the left mastoid process; removal of a large cholesteatoma. *A. f. O.*, vol. lviii., p. 228.

294. **De Stella.** A case of vestibular vertigo in a patient suffering from chronic otorrhœa. *Archiv. internat. d'otol.*, 1903, p. 905.

295. **Culbertson.** Case of removal of cochlea and semicircular canals. *Annals of Otology, Rhinology, and Laryngologygy*, June, 1903.

296. **Schiffers.** Clinical facts concerning bone complications in chronic purulent otitis. *La presse oto-laryngologique*, vol. 1903, part 7.

297. **Hoelscher.** Primary transplantation of a cutaneous flap after the radical operation. *Med. Korr.-Blatt d. württ. ärztl. Landesvereins*, 1903, No. 35.

298. **Schiffers.** Bone complications in chronic purulent otitis. *Annales de la société méd-chirurg. de Liège*, 1903, p. 503.

299. **Politzer.** A method for early closure of the wound cavity after operations on the mastoid. *Wiener med. Wochenschr.*, No. 30, 1903.

300. **Neufeld.** On the diagnosis of auricle tuberculosis. *A. f. O.*, vol. lix., p. 1.

301. **Potts.** The indications for operative interference in middle-ear suppuration. *American Journal of the Medical Sciences*, July, 1903.

302. **Leonard.** Tuberculosis of the middle ear, with report of a case. *Medical News*, July, 1903.

303. **Eemann.** The boric-acid dressing without packing, after the radical operation. *La presse oto-laryngologique*, vol. 1903, part 7.

291. Case 1.—Hemorrhagic inflammation of the labryinth with cholesteatoma. Softening of the surrounding bone. Perforation through the annular ligament of the stapes through the horizontal semicircular canal. Meningitis propagated along the auditory nerve.

Case 2.—Cholesteatoma, extensive destruction of the labyrinth capsule, destruction of the membranous parts of the cochlea, progressive degeneration of the auditory nerve; the nerve replaced by granulation tissue, though centrally the nerve fibres could still be recognized.

Case 3.—In acute left-sided middle-ear suppuration, formation of the sequestrum containing fistula and the semicircular canals. After recovery, on turning the patient on the rotating chair in the direction of the sound ear, no vertigo resulted; but the patient became dizzy when turned in the opposite direction. This the author regards as proof that a lymph current passing from a narrow space to the ampulla is capable of producing a sensation of movement.

Case 4.—Chronic purulent otitis. Recovery after removal of a large sequestrum consisting of the cochlea. On rotating in either direction no vertigo. Haenel.

292. Chronic otitis in a child two and a half years of age, with facial paralysis; later, mastoid affection, which improved; finally, exfoliation of the incus and a sequestrum through the posterior canal wall. The author believes that the acute symptoms of the mastoid process were caused by the dislocated incus acting as a foreign body. PIFFL.

293. The microscopic examination of the pus and of the disintegrated cholesteatoma—among other bacteria a number of bacilli were found which the author regarded as tubercle bacilli. He thinks that the formation of the cholesteatoma can be explained by the presence of these bacilli. HAENEL.

294. A patient twenty-five years of age with right-sided chronic purulent otitis suffered from continuous pain in the right temple and marked vertigo. Romberg's symptom was present. The region of the oval window was carious. On cleansing the ear, the cotton carrier dislocated a sequestrum into the vestibulum, producing intense vertigo, nystagmus, vomiting, twitching in the upper and lower extremities. The sequestrum was removed at the radical operation. The horizontal canal was found intact. Complete recovery.

In the after treatment of the radical cases, the author warns against too tight packing, as this leads to excessive formation of granulations. He employs exclusively boric acid. The average time of healing is forty days. OPPIKOFER.

295. The author used the electric current to locate position of the facial nerve during operation. BRYANT.

296. Three interesting cases of ear disease are described: a girl of sixteen with excessive anæmia was cured by operation of an extensive sclerosis of the mastoid.

A laborer twenty-two years of age obtained better hearing power on removing caries in the attic and antrum.

A young woman of eighteen suffered from caries of the attic and antrum in the right ear, and chronic suppuration in the left. The former was operated on, and healed; the other was improved by proper treatment. BRANDT.

297. A case of fœtid chronic otorrhœa with total defect of the drum was operated on radically and the bones everywhere found sclerosed. Primary transplantation of a very large Thiersch graft, carefully packing with iodoform gauze. First change of dressing after six days. Healing in one month. MUELLER.

298. Three cases of chronic middle-ear suppuration with facial paralysis and deafness. The paper is meant for the general practitioner, and shows what unfortunate terminations an auricle suppuration may have when the patient and the family physician have paid no attention to the lesion.

OPPIKOFER.

299. In order to bring about an early closure of the wound cavity, if the cavity is lined with healthy granulations it is filled out with fluid sterilized paraffin. After this mass becomes hard the edges of the wound are sutured. In all cases the hearing process was normal. This procedure is especially suited for those cases in which the antrum is not opened, as otherwise the hardened paraffin may invade the tympanum. The method is practised as soon as the wound cavity shows no purulent discharge. Under very favorable conditions, when the thorough eradication of all disease has been accomplished, the introduction of paraffin can be practised immediately after the operation.

Though the average healing period is not eight to ten weeks, as POLITZER says, but generally four to five, a shortening of the healing to about three weeks may perhaps stimulate others to adopt this new method. The number of observations, however, are much too few. WANNER.

300. Acid-fast bacilli have been found in the cerumen, which show a great similarity with the smegma bacillus in their location, as well as in the variability of their shape. The bacilli, as well as the epithelium, can occur in otorrhœa, and can themselves be mistaken for the tubercle bacilli. These pseudo tubercle bacilli are usually found isolated. In a case of cholesteatoma they were, however, very numerous. The experiments of Gottstein and Bienstock are recalled, in which the bacilli in a fat-containing medium were not at first acid-fast bacilli. He therefore recommends a very careful removal of all ointments before obtaining the material for examination. To distinguish the false from the true tubercle bacilli, the methods of von Honsell, Bunge, and Trautenrot are to be recommended, which depend upon the lessened resistance of the pseudo tubercle bacilli against alcohol.

HAENEL.

301. The symptoms indicating operation are as follows: Profuse and long-continued discharge suggests antrum or mastoid involvement. Fluctuating swelling over the mastoid or œdema behind the auricle is more apt to be due to furuncle. Tender-

ness over the mastoid, especially in the region of the antrum, is of great significance. A tender, bulging, posterior canal wall is the most important sign of all, and its non-relief from treatment is a sure indication for operation. A sinus, whatever its location, leading into the mastoid is a positive indication. Facial palsy is not important. Epileptiform attacks unusual, but may indicate cerebral pressure. Marked and rapid failure of health more often found in adults. Temperature more apt to be elevated in children. Rapid fluctuations of temperature through a range of several degrees is the most important sign in cases of pyæmia. The slow and thready pulse out of proportion to the elevation of temperature, irregularity and sluggishness of pupils, rapid failure of health, rigors or convulsions, are signs of intercranial pressure. Tenderness and œdema over the occiput are very apt to be present where the sinus is thrombosed. A bacterial examination is not always positive but important.

BRYANT.

302. Female, twenty years of age. American parentage. Family history of tuberculosis. Attack of influenza in the spring, —"treated for malaria." A discharge from the ear appeared on the pillow in September, slightly offensive; no premonitory symptoms. Two weeks later, an oblong perforation in the postero-superior quadrant. Membrane pale and edges of perforation averted. Tympanic mucous membrane thick and soft. No pain or tenderness. Eustachian tube patulous. Slight adenoids in pharyngeal vault; no history of rheumatic pains. Chest normal. Progressive deterioration of hearing and hammering tinnitus developed.

Discharge from the ear lessened under ordinary local treatment. The other ear began to discharge painlessly during sleep in December. Two perforations were found a few hours later in the lower half of the drum. Tubercular bacilli found in the discharge from both ears. In March of the next year a cough developed and the lungs were found affected.

The author calls attention to the usual occurrence of a multiplicity of perforations, absence of pain, slight degree of fœtor of discharge. Patency of Eustachian tube.

Tuberculous infection of the ear may come from primary infection of adenoids. He suggests the routine microscopic examination of all discharges from the ear. BRYANT.

303. The author reports upon the after-treatment with boric

acid. He fills the entire wound cavity with boric-acid powder, the quantity of which is diminished with the decrease in the discharge, until finally only the places which are not covered with epidermis are dusted with the powder. The dressing is very much simpler. The manipulations are painless and the length of after-treatment is shortened. BRANDT.

c.—CEREBRAL COMPLICATIONS.

304. **Kissel.** A case of otogenous abscess of the temporal lobe of the brain of a child four years of age. *Djetskaja Medizina*, No. 2, 1903.

305. **Zaalberg.** A case of inflammation of the middle-ear cavities, ending in fatal meningitis, which was produced by an extradural abscess not recognized during life. *M. f. O.*, No. 5, 1903.

306. **Hertle.** On external pachymeningitis. *Wiener klin. Wochenschrift*, No. 32, 1903.

307. **Schulze.** Aural suppuration and cerebral tuberculosis. *A. f. O.*, vol. lix., p. 99.

308. **Haike.** Cerebral tuberculosis in the floor of the fourth ventricle and in the posterior cerebellar crus in chronic purulent otitis. *A. f. O.*, vol. lviii., p. 206.

309. **Zaufal.** Contribution to the ligation of the central end of the internal jugular vein after resecting the clavicle in otitic septic thrombosis of the sinus and of the jugular. *Prager med. Wochenschr.*, 1903, No. 37.

310. **Grunert.** On the limits of operative possibilities for otitic sinus thrombosis. *A. f. O.*, vol. lix., p. 70.

311. **Alexander.** On the pathology of internal pachymeningitis in cases of otitic pyæmia. *M. f. O.*, 1903, No. 3.

312. **Labarre.** Contribution to the study of intracranial complications of the ear. *La presse oto-laryngologique Belge*, 1903, part 7.

313. **Courtade.** A case of phlebitis of the lateral sinus of aural origin, with abnormal vascularization of the auricle. *Arch. internat. d'otologie*, etc., 1903, p. 943.

314. **Geschelin.** On otitic pyæmia. *Chirurgija*, vol. xiii., No. 76.

315. **Gosewer.** Should the internal jugular vein be ligated in otitic pyæmia? *Chirurgija*, vol. xiii., No. 76.

316. **Heine.** On the operative treatment of otitic sinus thrombosis. *Arch. f. klin. Chir.*, vol. lxx., 3.

317. **Stenger.** The otitic cerebral sinus thrombosis. *Habilit.-Schrift*, Königsberg, 1903.

318. **Hoelscher.** Three cases of extradural and persinuous abscesses cured by operation. *Med. Korr.-Blatt d. württ.-ärztl. Landesvereins*, 1903, No. 31.

319. **Wertogradow.** On the symptoms and treatment of sinus thrombosis. *Wojenno-Medizinski Shurnal*, July and August, 1903.

320. **Breyre.** Phlebitis of the lateral sinus, ligation of the jugular vein. Death. Autopsy. *Annales de la société méd.-chir de Liège*, No. 7, 1903.

321. **Randal.** Septic sinus thrombosis due to ear infection. *Medicine*, Detroit, July, 1903.

322. **Kayser.** Acute otitis media, mastoiditis, thrombosis of the sinus and jugular vein. Operation. Recovery. *Hygeia*, No. 10, 1903.

304. The sickness developed rapidly with violent symptoms, and was regarded as an acute infectious encephalitis.

The autopsy showed a bilateral otitis media, an abscess in the right temporal lobe, and the beginning of a purulent leptomeningitis. SACHER.

305. The extradural abscess was situated on both sides of the crista pyramidalis and extended into the middle and posterior cranial fossæ,—in the latter towards the internal porus acusticus. PIFFL.

306. In a patient, aged thirty-six, a shallow, soft, circumscribed protrusion of the skull appeared over the left ear. Paralysis of the facial, hypoglossus, and of the extremities of the opposite side. Very severe headache; left-sided optic neuritis.

After more than a year, the skull was trephined and a large amount of pus evacuated. The dura was covered with grayish-red granulations in which many tubercle nodules as large as the head of a pin were visible. The bone was thoroughly healthy, and there was no connection with an aural affection. WANNER.

307. After a brief report of the nine cases which have previously been published, the author reports on two cases of aural suppuration and cerebral tuberculosis which were observed in the Halle clinic during the past year:

(1) A boy, sixteen years of age, with a hereditary tubercular history and bilateral fœtid middle-ear suppuration, was recommended to the clinic on account of a probable brain abscess. There was right-sided facial paralysis, paresis of the right arm, weakness in the legs, and a disturbed psychical condition. During the period of observation, it was found necessary to do a radical operation on the right side, an operation on the sinus with jugular ligation, and a radical operation on the left (tuberculous caries). A profuse hemorrhage from the sinus occurred in the last operation, which was the beginning of a fatal miliary tuberculosis. The autopsy showed a conglomerate tubercle in the pulvinar of the left thalamus opticus, which was evidently of old date but had probably developed more rapidly after an injury to

the skull received before admission to the hospital. During life the probable diagnosis of cerebral tuberculosis was made.

(2) A child eight years of age was operated on because of caries. There were headache, vomiting, change of psychic condition, choked disc, retarded pulse, and symptoms pointing to an intracranial complication. The result of the lumbar puncture showed an absence of purulent meningitis. A presumable abscess of the temporal lobe was trephined for. This was not found, and suddenly cerebro-spinal fluid burst from the cranial wound after rupture of the ectatic lateral ventricle. Purulent meningitis and death. The intracranial changes were found at autopsy to consist of old cerebral tuberculosis. A fresh miliary tuberculosis existed in the other organs which were affected secondarily to the lungs. The differential diagnosis between brain abscess and brain tumor—that is, brain tubercle—is carefully gone over.

A typically developed choked disc speaks for brain tumor. The absence of this points with considerable certainty to a brain abscess. Frequent remissions in the course of the disease, sudden change in the symptoms, a combination of the symptoms which cannot be referred to one focus, the existence of cerebellar symptoms with an intact labyrinth, all suggest brain tubercle, if the patient is young and with a distinct family history of tuberculosis or with other tuberculous manifestations. HAENEL.

308. Copious report of a case: During life, the diagnosis wavered between brain abscess and a serous meningitis. Lumbar puncture evacuated no fluid, from closure of the spinal canal through an excessively distended ventricle into the subarachnoid spaces. Opening of the temporal lobe was without result. On the last day opisthotonos pointed to localization in the cerebrum. Puncture of the cerebrum was also negative. At autopsy the diagnosis was made. The absence of choked disc was noticeable—which is usually an early and constant symptom in tumors of the cerebrum, especially in the presence of increased intracranial pressure. The author believes that the continuous and severe headache, as well as the negative result of the lumbar puncture, points to a tumor in the posterior cranial fossa. The frequent combination of otorrhœa and brain tubercle is explained as following a toxic action from the purulent middle ear, thus lowering the power of resistance of the tissues against an invasion of the tubercle bacillus. HAENEL.

309. ZAUFAL describes the case of a twenty-one-year-old student with a septic thrombosis of the sinus and jugular vein after chronic purulent otitis. In order to ligate the jugular vein in this lower part, the clavicle had to be resected. The case was healed after three months. The attempt should always be made, however, to accomplish the resection without dividing the clavicle. If, however, isolating the vein in the depth of the wound and the passage of the ligature meet with difficulty, especially if it is uncertain whether the ligature can be applied to a healthy part of the vein, then resection of the clavicle is in order, so as to allow work without danger in the depth and test the limit of the occluding thrombus towards the healthy venous channel.

PIFFL.

310. The prognosis of the sinus operation depends upon localization and extent of the thrombus, its virulence, its situation, and the numbers of the metastases, as well as on the severity and curability of the complicating intracranial changes. Two cases of thrombosis are reported where, notwithstanding an unusual extension of the thrombus, recovery took place after operation. In one case, the jugular vein was ligated at its opening in the subclavian vein; in another, the thrombus had reached the torcular Herophili and the external sinus wall was cut away. In the first case, a subluxation of the clavicle was necessary in order to gain access to the subclavia. In cases of necessity, GRUNERT recommends that the clavicle be sawed through. These two cases are supposed to represent the limits of operative possibilities.

HAENEL.

311. ALEXANDER reports a case of pyæmia with pulmonary metastasis following sinus thrombosis in chronic purulent otitis. The incision of the sinus was followed by the escape of fœtid particles, with copious hemorrhage. The ligation of the vein was nevertheless not undertaken. One month later death followed. After a month, increase of the signs in the lungs and of the pyæmic fever. The autopsy showed multiple old and fresh pulmonary abscesses and a parietal thrombus in the neighborhood of the jugular bulb. The venous channel was free, an internal pachymeningitis was present, corresponding to the convexity of the right hemisphere with an intact arachnoid, pia, and brain surface. The disease of the dura consisted of a number of fibrinous, purulent deposits on the inner surface.

PIFFL.

312. LABARRE reports on a case of caries of the petrous bone with periphlebitic abscess, purulent exudate into the cranial cavity, and sinus thrombosis, in which an operation which had been deferred for two months on account of the non-consent of the patient, led to recovery. From this one case the author attempts to show that a preliminary ligation of the internal jugular vein in sinus thrombosis is unnecessary, if at the time of the operation no change in temperature has been observed.

BRANDT.

313. Purulent sinus thrombosis and pyæmia following right-sided chronic middle-ear suppuration in a child eleven years of age. As the general condition of the child was very bad, operation was not undertaken. Death.

As a peculiarity, five or six venous vessels are mentioned which pass on the posterior surface of the auricle in a transverse direction to its free margin. As the external jugular vein, which is the normal outlet of these veins, was not thrombosed, an anomaly in the vascular distribution is assumed, in that the blood out of the posterior auricular vein escaped exclusively through the mastoid veins into the lateral sinus. OPPIKOFER.

314. A report of 24 cases of otitic pyæmia, of which 12 were produced by a chronic and 12 by an acute otitis. Of the cases associated with chronic otorrhœa, 8 presented pyæmia without intracranial complications. Of these, 1 recovered without metastasis and without operation; 2 without metastases were cured after opening the sinus and removing the thrombus; 4 died after operation on the sinus from numerous metastases in the muscles, joints, and lungs; 1 died after the sinus operation and ligation of the jugular; the 4 remaining patients died from abscesses in the cerebrum or cerebellum, extradural abscess, or purulent meningitis.

The enormous mortality among pyæmic patients after chronic otorrhœa (9–12) is explained by the fact that the disease had been neglected. Of the 12 pyæmic patients with acute otitis, 10 recovered; in 5 the thrombosis was found in the transverse sinus; in 4 of these the jugular vein was ligated; in the remaining 7 the sinus was not operated upon; of these, 2 died, one from meningitis and the other from degeneration of the viscera 1½ years after operation. In only 3 patients of this last series were there no metastases. In all the others, metastases—partly purulent and partly serous—were present. In 2 patients new metastases de-

veloped, notwithstanding ligation of the jugular vein. Whether in those seven cases the sinus was thrombosed in which the operation was simply opening the mastoid process can be negatively answered for only one case which died from meningitis. In this case, the contents of the sinus on puncture were normal, which was also confirmed at autopsy. SACHER.

315. The author is in favor of early ligature of the jugular vein. SACHER.

316. From 1881 to 1901, 111 cases of pyæmia were treated; 27 of these, with 2 recoveries, belonged to the time before the sinus operation. Of the 84 operated upon, 52 died, 32 recovered. As in 16 cases death was not the result of the sinus thrombosis, 68 cases remained, with 32 recoveries. Immediate exposure of the sinus is indicated when fever sets in and disease of the sinus is made probable. If the fever changes, or if rigors appear, the contents of the sinus must be determined. The sinus should be opened and its pathological contents evacuated to the region of the healthy thrombus or until hemorrhage is restored, with ligation of the jugular vein. Puncture of the sinus should be replaced by incision. Diagnostic incision of the sinus, however, should be restricted, as it is not without danger. The jugular vein is ligated in primary and secondary obturating thrombosis of the bulb, which has led to severe pyæmic symptoms and in manifest disease of the jugular vein; also, in the cases where it has been impossible to reach the central end of the thrombus, and when pyæmic fever continues; in the presence of a parietal thrombus, when a broad opening of the sinus is not sufficient. BRUEHL.

317. From a report of fifteen cases of sinus disease which were observed in the Charité hospital, STENGER describes the anatomical conditions, the causation, symptoms, diagnosis, and treatment of otitic sinus thrombosis. As sinus disease after acute suppurations must be differently regarded from that following chronic, in the first series it is often sufficient to simply remove the primary disease focus; as the thrombosis after chronic suppurations, on the other hand, shows a greater tendency to disintegrate and produce metastases, in addition to the removal of the morbid focus the ligature of the jugular vein is indicated. This ligature must precede the evacuation of the sinus. In cases of isolated thrombosis of the bulb, with metastases, the jugular vein should be ligated. BRUEHL.

318. CASE 1.—Acute otitis media, paracentesis, improvement.

Several weeks later, hemicrania, transient œdema behind the ear, persistent profuse discharge. At operation a large abscess cavity occupied the entire mastoid process; exposed sinus and the dura of the middle cranial cavity. Recovery.

CASE 2.—Acute otitis media; moderate symptoms for a long time, then the patient became worse, complained of severe headache, profuse discharge, œdema, sagging of the posterior canal wall. At operation a large extradural abscess was found in the posterior cranial fossa; the sinus was transformed into a thick mass of granulations. According to the author, a thrombophlebitis of the sinus was just beginning, which recovered spontaneously, while the extradural abscess persisted.

CASE 3.—Bilateral acute purulent otitis, severe symptoms from the first. Operation on both sides about one month after beginning of the disease. Extradural abscess in the posterior fossa was found on the left side. Recovery. MUELLER.

319. A description of seven cases of otitic sinus thrombosis. The most important and reliable symptoms of this disease are the following: (1) Sudden onset of the disease in a patient suffering from otorrhœa. (2) A violent course, with rigors and intermissions. (3) Pain in a circumscribed area behind the mastoid process in the region of the emissary vein. (4) In optic neuritis the operation should be immediately undertaken. SACHER.

320. A child ten years of age has suffered from right-sided ottorrhœa for six years, following an attack of measles. Headache, loss of appetite, constipation, high, irregular fever and rigors were present. A few days after exposing the mastoid the sinus was laid bare. Its outer wall was gangrenous. The internal jugular vein was changed by inflammation, and was resected down to the clavicle. Abscess of the lungs. Death.

OPPIKOFER.

321. Of late this disease has been coming more frequently into general notice. The diagnosis is extremely difficult because the complex of classical symptoms is usually wanting. The delay caused by waiting for these symptoms may be fatal, and a readiness to operate is justified in these cases.

CASE 1.—Otorrhœa, lasting for years. The previous attack lasted one week. A year ago there was threat of serious trouble. Has now been ill one week with some fever, headache, and swelling about the mastoid, apparently glandular. A chill last night. Temperature, 103.3° at 5 P.M. ; 102° at 9 P.M.

Tenderness and slight swelling behind mastoid, and tender induration on upper end of jugular. General condition typhoid. Operated an hour later. Ligated intact jugular in its lower third. Opened stony-hard mastoid, and uncovered a discolored thrombosed lateral sinus. The vessel ruptured and dark, fœtid fluid escaped. Its lumen curetted back to torcular without securing flow of blood. Curetted forward into jugular bulb, whence sluggish blood flowed.

Patient discharged on thirtieth day.

CASE 2.—Child of nine, seen in October.

Chronic suppuration and polypi growths, which were removed.

Next March: Serious cranial symptoms; no nausea or convulsions. Temperature not above 102°; frequent delirium and stupor. Chill, temperature 105.3°; no induration of the mastoid or neck, although several cervical glands were recognized as enlarged along the great vessels. No slowing of the pulse or subnormal temperature. Operation.

Cholesteatoma in the antrum and softened bone throughout the mastoid, which was thoroughly eviscerated, showing the inner table intact; an opening showing an apparently healthy sinus.

Temperature fell in twelve hours to 97½°; rose to 104° in the evening; next midnight 107.3° in axilla. No manifestations of sinus or jugular thrombosis could be found in the neck. Operation for sinus-thrombosis; jugular uncovered, and was found indurated and greatly thickened, with dark fœtid pus in its scanty lumen as far as the innominate; the vein ligated, and completely dissected out. The wound of the previous operation cleansed; the lateral sinus, when opened, was found filled with greenish, broken-down clots as far as the sigmoid portion, but healthy in its lateral portion. Jugular bulb curetted from above and below. Patient suddenly collapsed. All efforts at resuscitation failed. It cannot be doubted that full uncovering of the sinus at the first operation would have revealed its dangerous condition, and might have changed the outcome. It should be an easy and harmless procedure to lay bare the sinus when the mastoid has been eviscerated, and to open the sinus and explore its contents is not very serious. Repeated partial interventions with general anæsthesia are unadvisable unless required by failure of patient's strength. Marasmic thrombosis, usually affecting the sinuses, is less prone to infection from the ear and it lacks septic malignity. In acute cases of ear trouble the jugular bulb is

the part usually involved. A clot quickly organizes, interfering with the spreading. In chronic otorrhœa the sigmoid portion of the lateral sinus is generally the part affected, and the process of phlebitis extends in both directions and is not self-limited.

W. S. BRYANT.

322. Ligation of the jugular vein before the radical operation.

MOELLER.

(*To be concluded.*)